

a DSC before being shot down and killed while at the controls of another machine in April 1918. Lusk and the two non-commissioned crewmen got nothing.

The Germans had not been seriously hurt by the raids upon the Bruges-Ostend-Zeebrugge naval complex, but certainly they regarded these attacks as dangerous. In late September and early October they mounted a strong counter-offensive with aggressive fighter patrols and night-bombing attacks. Two Canadian pilots, Flight Sub-Lieutenants Keirstead and G.S. Harrower of Montreal, both claimed victories in this period. The British were unable to stop the bombing, however. The two Gotha units in Flanders, Nos 1 and 3 *Bombengeschwader*, dropped over 120 tons of bombs on Calais, Poperinghe, Dunkirk, and the major RFC base at St Omer in a series of night raids, causing heavy damage. The greatest successes were won at Dunkirk. On the night of 24 September the Gothas raided the Dunkirk depot at St Pol, destroying machine shops, technical records, and 140 aircraft engines. The raids on St Pol were repeated nightly and culminated on 1-2 October with an attack by twenty-four machines from No 1 *Bombengeschwader*. They destroyed twenty-three aircraft, damaged another thirty, and gutted a number of sheds and hangars. These concentrated attacks reduced RNAS strength, seriously impaired its operational efficiency, and helped bring 9(N) Squadron back to Dunkirk from the Western Front earlier than had been intended. R.H. Mulock was transferred temporarily from the command of 3(N) to reorganize the supply base; in November he became commander of the Dunkirk Aircraft Depot and Breadner took over command of the squadron.³⁰

The attacks were also in response to a joint RFC-RNAS assault against German air bases, which had forced the enemy to shift Gotha operations from St Denis Westrem to Mariakerke, and from Gontrode to Oostacker, north of Ghent. These raids had been ordered because of the resumption of German night bombing against England, but in October Dunkirk began to be affected by the British decision to create a bombing force for long-distance raids against Germany itself. On 4 October Sir Douglas Haig asked Bacon to allocate some of his Handley Pages for long-distance attacks on Belgian rail and road communications and asked that the radius of their attacks be gradually increased to encompass German targets. On 28 October nine bombers were despatched against Germany. Five Canadians took part in this initial raid: Flight Lieutenant C.H. Darley, with Flight Sub-Lieutenant H.L. Webster, both from Montreal, as his observer, and Flight Sub-Lieutenants J.R. Allan of Ottawa, F.R. Johnson of Montreal, and the observer H.H. Costain of Brantford, Ont. Because of bad weather, only one of the nine bombers managed to reach Germany; the rest elected to bomb targets in Belgium. Six of the Handley

20 August 1917, according to R.M. Grant, *U-Boats Destroyed: the Effect of Anti-Submarine Warfare, 1914-1918* (London 1964), 153. Grant also spelt out the causes of the loss of all U-boats, but he complicated the UB 32 issue by reporting her sunk in the vicinity of the Sunk Light Vessel, off the mouth of the River Thames, an error he corrected in his *U-Boat Intelligence, 1914-1918* (London 1969), 186, where the location is recorded in latitude and longitude. Meanwhile, Erich Gröner, in his massive two-volume study, *Die deutschen Kriegsschiffe, 1815-1945* (München 1966), 1, 364, located the sinking south of the Isle of Wight, although he accepts that UB 32 was sunk by a flying-boat. See also R.D. Layman, P.K. Simpson, and E.J.L. Malpern, 'Allied Aircraft vs. German Submarines, 1916-1918.' *Cross & Cockade Journal*, xi, (winter 1970), 289-302.

Pages attacked factories at Antwerp. Trenchard, who was responsible for bombing operations along the entire front, was criticized for his action on the ground that large centres of Belgian population, well back from the lines, were not acceptable targets. He gave instructions that in future Antwerp and Brussels were to be spared.³¹

In November poor weather heralded the onset of winter and the curtailment of operations. Bombing was reduced to occasional short-distance forays. On one return flight in December the RNAS bombers were harried by Albatros fighters. Sproatt, leading the escort, plunged at one and reported that 'Machine stalled and then fell spinning rapidly. I then lost sight of it for some seconds and finally saw a number of pieces fall into the sea.' It was the last aerial victory on the coast in 1917.³²

As operations diminished so, temporarily, did Dunkirk's pilot strength. In a five-week period prior to the end of October, casualties, illness, and transfer saw the loss of sixty-one pilots; only nineteen replacements were sent out. In November, however, 1(N) and 10(N) Squadrons returned from the Western Front and Lambe was able to begin rotating squadrons for rest periods to English bases, as he had promised. In January 1918 Dunkirk activities were further cut back when the seaplane station was turned over to the Americans and the Large America sent back to Felixstowe. Anti-submarine patrols were now to be handled by a new squadron, 17(N), flying DH4s, while the fighter pilots of the former seaplane defence flight became the nucleus of a fighter squadron, 13(N), under the temporary command of Raymond Collishaw.^{*33}

These minor organizational changes were overshadowed by greater ones in the naval command and in the relationship of the RNAS with the RFC. One of the initial acts of Admiral Sir Rosslyn Wemyss after he succeeded Jellicoe as First Sea Lord was to appoint Rear-Admiral Roger Keyes to replace Vice-Admiral Bacon, whom Keyes had out-maneuvred in a dispute over the effectiveness of the Channel barrage. When Keyes arrived at Dover, however, he found that the Air Council, which had come into being on 3 January 1918 under the Air Force Act, was already exerting its authority. Several Dunkirk units were transferred to army control, and then came a major and drastic reduction. The headquarters of 4 and 5 Wings and 3 to 9 Squadrons, inclusive, were removed from Dunkirk and were placed directly under the Commander-in-Chief, BEF. All that remained for naval duties of Dunkirk's once sizeable organization was a reconnaissance squadron, the DH4 anti-submarine squadron, and three squadrons of Camels.³⁴

In their correspondence and their memoirs, both Bacon and Keyes seemed genuinely appreciative of the RNAS' work at Dunkirk. Among the achievements they detail were spotting by naval airmen for the bombardments of the Flemish

* Flight Sub-Lieutenants H.H. Gonyon of Chatham, Ont. (wia 30 May 1918) and C.E.S. Lusk of Toronto converted from seaplanes to DH4s to become initial members of 17(N); they were joined shortly by two other Canadians, R.M. Berthe of Montreal and J.A. Shaw of Edmonton. Other Canadians in addition to Collishaw with 13(N) were P.E. Beasley of Victoria, J.E. Greene of Winnipeg (kia 14 Oct. 1918), G.C. Mackay of Sunderland, Ont. (wia 15 Sept. 1918), W.J. Mackenzie of Port Robinson, Ont. (wia 21 April 1918), and G.L.E. Stevens of Peterborough, Ont.

coast, photographic surveys of shipping dispositions and German defence systems from Nieuport to the Dutch frontier, and the dropping of a large tonnage of bombs against strong opposition from German fighters, more than half of it upon railways and aerodromes.³⁵ For three years Canadians had taken part in these operations. At its peak in December 1917 the command had a strength of 243 pilots, eighty-three of them Canadians. Of the sixty-four pilots killed, interned, or captured between January 1917 and March 1918, twenty-one (30 per cent) were Canadians. In 1915 R.H. Mulock had been the first of his countrymen to arrive at Dunkirk; in 1918, as a wing commander, he was the senior Canadian officer in the RNAS. By March 1918 two Canadians, Collishaw and Wemp, were commanding squadrons and many others were flight commanders.

In retrospect, it must be said that the services of all these men could have been put to better use. Both at Dunkirk and in the Admiralty there was an exaggerated view of the material damage caused by bombing. Dunkirk had launched raids frequently, but they were usually small and rarely concentrated. The enemy was able to repair damaged installations and, in the case of airfields, to switch operations easily from one grass field to another. Though the bombing had caused the Germans to erect a network of ferro-concrete pens at Bruges to protect this major U-boat base, construction work and operations were only slowed, never stopped, by the raiding.³⁶

Bombing had not defeated, nor even substantially affected, the submarine campaign. Nor had Bacon's net barrage, over which the RNAS had patrolled so dutifully, prevented U-boats from slipping through the Channel. Some of the most valuable contributions of the RNAS at Dunkirk bore little relation to naval needs. RNAS fighter squadrons played a vital part on the Western Front in 1917, and its bombing in support of army objectives had been of some use, within the limits of the weapon. It was therefore all too easy for the army and the RFC, pleading quite reasonably on grounds of highest military urgency, to take advantage of this naval enclave on their left flank where good pilots and good aircraft were in apparent abundance. Such would not have been the case if the employment of aircraft at Dunkirk had been subordinated to an over-riding strategic objective.

It is now clear that the RNAS should have concentrated on air-sea co-operation to defeat the German attack upon shipping. First World War submarines had a very limited underwater performance and were susceptible to air attack while on the surface. The Admiralty staff, however, had little belief or interest in such an approach. Instead, they relied upon ever more complex routing arrangements for vessels steaming to and from United Kingdom ports, and a substantial enlargement of the surface patrol in home waters. By July 1917 it included 2800 yachts, trawlers, drifters, motor boats, and paddle minesweepers. The endeavour of the RNAS to reorganize its available forces to co-ordinate more effectively with ships, and to make more efficient use of its resources for the anti-submarine campaign, suffered from the lack of any strong lead from the Admiralty.³⁷

In the early spring of 1917 the aircraft available for anti-submarine warfare consisted of 176 'Class I' – that is, first-line – heavier-than-air craft and forty-six airships. Seven areas of responsibility on the east coast were centred respectively on Scapa Flow, the Dundee Command, South Shields, the Killingholme Command, Great Yarmouth, the Harwich Command, and the Nore Command. The Dover

Patrol was to cover the eastern Channel; the Portsmouth Group with its main air station at Calshot and two sub-stations at Bembridge (Isle of Wight) and Portland concentrated on the mid-Channel area; and the South-West Group, centred on Devonport with stations at Cattewater, Newlyn, Scilly Isles, Fishguard, Mullion, and Pembroke, covered the Western Approaches.³⁸

In July 1917 forty-three of the 147 pilots in British home stations were Canadians.* At various times during the ensuing fifteen months there were Canadians in all these stations with a high proportion of them at Felixstowe (where ten of the twenty-one pilots were Canadian at the start of 1917), Dundee, and to a lesser degree, Killingholme and Calshot. In marked contrast to their colleagues in the Dover-Dunkirk organization who were frequently shifting between squadrons, the 'web-footed boys' often served for anything up to two-and-a-half years with the same unit. While most of the flying in the 1917 anti-submarine campaign was done in seaplanes, the majority of pilots at the larger east-coast stations were also qualified on land-planes and, as at Great Yarmouth, were 'expected to take any of the various types into the air by day and the BE2Cs by night'.³⁹

Pilots for Large Americas trained and operated at Felixstowe. In February 1917 two Canadians in the first group of trainees, Flight Sub-Lieutenants F.S. McGill and J.O. Galpin of Ottawa, were among those from Felixstowe who established the 'Porte Boat Flight' on Tresco in the Isles of Scilly where McGill became second-in-command.⁴⁰ On 13 April Large America No 8661 inaugurated patrol flights from Felixstowe and the same day Flight Sub-Lieutenant R. Leckie and his crew collected No 8660 for Yarmouth Station. Other flying-boats went to Calshot and Killingholme from the original contract of fifty aircraft, forty-seven of which were delivered by the end of the year.

At the outset of the unrestricted submarine campaign, declared in February 1917, Germany had over a hundred U-boats assigned to operational flotillas. Of these, almost half were based on German North Sea ports, about one-third at Zeebrugge and Ostend, and most of the rest in the Mediterranean. The total rose to a maximum of 139 in September with an average of forty-six on patrol at any time. New tactics required U-boats to attack submerged with torpedoes rather than surfacing to engage with gunfire, and those stationed in the North Sea or Channel ports operated in specifically assigned sectors. Submarines bound for more distant waters normally travelled through the English Channel to and from their stations, but if forced to return by the northern route, because of damage or any other reason, they were 'to let themselves be seen as freely as possible, in order to mislead the English'.⁴¹

The anti-submarine tactics developed during the year by the RNAS depended principally upon the assumed endurance performances of aircraft.[†] There was, as

* In addition, A.S. Ince of Toronto was flying as an observer from Calshot.

† These were as follows:

Coastal Airships	8-12 hours
SS	4-8
H12 Large Americas	2-6
Short Seaplanes	2-4
Sopwith Seaplanes	1-2
Aeroplanes	1-1½

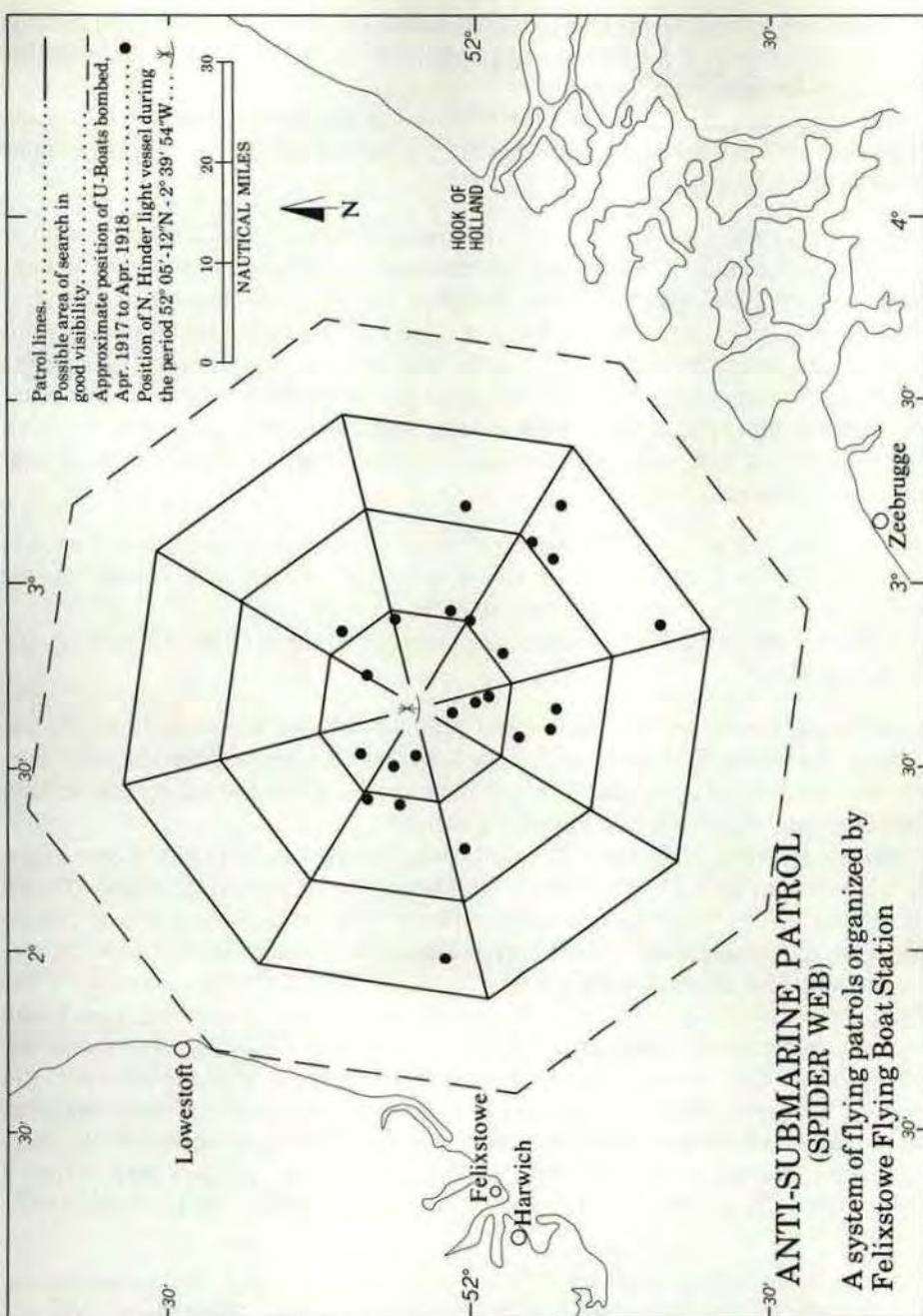
yet, no standard doctrine. At Plymouth, however, aircraft were expected to fly routine, emergency, or contact patrols. Routine patrols consisted of search patterns expanding from the air station, flown either on a straight or zig-zag course according to orders issued on a daily basis. Command headquarters would order an emergency patrol if a U-boat sighting or wireless transmission occurred, but airships and seaplanes were to investigate to a distance of no more than fifty miles from shore and aeroplanes were restricted to twenty-five miles. In contact patrols two or three destroyers or motor launches steamed in line abreast while an aircraft flew a zig-zag patrol across the main line of advance, communicating at regular intervals by lamp, wireless telegraphy, or horizontal semaphore. All patrols were supposed to be flown at 1000 feet, because this was the best height for spotting a submarine silhouette as well as for detecting wind changes by reference to the wave caps.⁴²

Routine search plans reflected the geographical features of each area and the need to prevent either overlapping or lack of continuity in the air coverage of coastal water. Thus the Admiralty ordered RNAS pilots not to bomb unrecognized submarines outside the limits of their own command. In the South-West Group the seas around each air station were divided into a series of triangular patrol sectors using the station as apex and subdividing each triangle into smaller triangles with bases at 15, 30, 45, 60, and 75 miles out. In the North Sea, Felixstowe developed the famous 'Spider Web' for large flying-boats. Having the Netherlands North Hinder Light Vessel, 52 miles from Felixstowe, as its centre point, the 'web' was an imaginary octagonal figure 60 miles in diameter with eight 30-mile radial arms joined by chords at 10, 20, and 30 miles out. About four thousand square miles of ocean, which it took U-boats up to ten hours to traverse at surface cruising speed (in order to conserve battery power), could thus be systematically searched. With its capability of covering three hundred miles, a single flying-boat could patrol a large segment of the 'web,' the specific sectors for each trip being determined from a master chart at the station which showed the positions of submarines by directional wireless intercepts. This proved more effective than the less patterned patrol which Yarmouth flying-boats carried out along the enemy coast from the Texel to Borkum.⁴³

The founder and commanding officer of the Felixstowe 'War Flight' was Flight Commander T.D. Hallam of Toronto, who had entered the RNAS through the armoured car organization which went to Gallipoli in 1915. He was older than most men joining the air services, and because of his wounds he was forbidden to fly. While at Hendon Air Station, however, he disregarded his medical restrictions, qualified to RNAS flying-boat pilot standards, and arrived at Felixstowe in March 1917. This 'thin, dried up' Canadian enjoyed a flying career of great distinction in the subsequent year-and-a-half.⁴⁴

Hallam's description of the first patrol by a Large America on 13 April 1917 tells us much of the nature of this work:

At ten o'clock, on this day, a day with an overcast sky and a twenty-knot westerly wind blowing, I sounded off five sharp taps on the bell, the signal for patrol. The chiefs of the engineer, carpenter, and working parties reported for instructions.



The working party of twenty men gathered around *Old '61* and rolled her out of the shed to the concrete area. Here they chocked her up under the bow and tail ... to prevent her standing on her nose when the engines were tested ...

In the meantime the armourers' party had fitted on the four Lewis machine-guns and had tucked up into place under the wing roots, two on each side of the hull, the four one hundred pound bombs.⁴⁵

The crew boarded after all these preparations had been made. The first pilot sat in a cockpit 'covered by a transparent wheelhouse' so that he did not have to wear goggles, since these were thought to interfere with efficient observation. If a submarine was sighted the second pilot was supposed to move to the open forward cockpit with its machine-gun, bomb-sight, and bomb-release levers. The wireless operator sat facing forward on the right-hand side of the boat behind the first pilot, with his wireless cabinet, code books, Aldis signalling lamp, and carrier pigeons. The engineer sat in the cockpit amidships. The working party then rolled the boat out of the slipway:

Here six waders, in waterproof breeches coming up to their armpits, and weighted boots to give them a secure foothold when the tide was running ... steered the boat down into the water, the working party easing her down by tailing on the line ...

As the flying-boat entered the water ... the thrust of the engines urged her forward, and she taxied clear.⁴⁶

Under good conditions the boat would become airborne at about 35 knots, but landing and taking off in bad weather made exceptional demands on the pilot. This was also true of long patrols: 'Coming back against a head-wind, it took so long that I thought somebody had moved England.'⁴⁷

Initially the only other Canadian pilot in the Felixstowe 'War Flight' was Flight Sub-Lieutenant B.D. Hobbs of Sault Ste Marie, Ont. It was on the flight's fourth patrol that Hobbs made the first submarine sighting report. Two days later, on 20 April, two British pilots in No 8661 dropped four 100-lb bombs on a surfaced U-boat, and on the 23rd Hallam made his first bombing attack.* By the end of April the flight's score stood at eight submarines sighted and three bombed. One Large America had been lost, though its crew was rescued by fishermen. For the pilots, who had patrolled for thousands of miles since the beginning of the war with little to show for their efforts, the new turn of events was exhilarating. Volunteers lined up for duty and Hallam noted that his fellow-countrymen were well to the fore: Canadians 'seemed to be best fitted for flying-boat work, and probably as high a proportion as three fourths of the good boat pilots came from that dominion.'^{†48}

* Awards, including a Bar to Hallam's DSC, were given for the attack of 23 April but records show conclusively that no U-boat was destroyed. Grant, *U-Boats Destroyed*, app. 81, 152

† Early Canadian additions to the flight included H.J. Bat of Oakville, Ont., H.G. Boswell of Toronto, J.O. Galpin of Ottawa, J.L. Gordon, G.R. Hodgson, and N.A. Magor, all of Montreal, and V.H. Ramsden of Toronto. Gordon and Hodgson had previously been in the Nore 'Defence Flight.' On the ground they received advice on the subtleties of bombing from the armament officer, A. Partridge, a former member of the Canadian Army, during his 'continuous performance for their benefit entitled ... Frightfulness for Fritz.' P.I.X [T.D. Hallam], *The Spider Web: the Romance of a Flying-Boat War Flight* (London 1919), 53-4

In May the Felixstowe 'War Flight' alone reported seven sightings and five bombings. One made on 20 May by Flight Sub-Lieutenant Henry G. Boswell of Cobourg, Ont.,* second pilot to a British officer, Flight Sub-Lieutenant C.R. Morrish, led to the British official historian giving the crew credit for destroying UC 36 'which seems to have been the first direct sinking of a U-boat by aircraft during the war.' The claim has since been discredited, and it is a remarkable coincidence that a British submarine, E 33, was bombed (but not hit) under similar circumstances 'in the same area and about the same time'.⁴⁹

In July two more such claims were made by Felixstowe aircraft, but these cannot be substantiated by the evidence now available. Nevertheless the general increase in submarine sightings and attacks shows that aircraft patrols, particularly from Felixstowe with its monthly average in May, June, and July of six sightings and four attacks, were increasingly effective in harassing the daylight operations of U-boats. Bad weather in August forced a drastic reduction in aerial patrolling, but submarine sightings around the British Isles totalled thirteen for the month, mostly in the western areas. Sopwith 1½ Strutters from Prawle Point and Mullion forced U-boats to dive but never managed to get in an attack because, in the view of one authority, their engines were so noisy. An additional peril of flying these aeroplanes on routine maritime patrols was brought home to Flight Lieutenant W.J. Sussan of Ottawa,[†] when his engine 'fell to pieces' and he was forced to land in the sea. He and his observer, drifting in life-jackets, were found by purest chance in the gathering dusk when a destroyer stumbled upon them. The problem did not arise again because, fighter pilots being needed on the Western Front, aeroplane detachments were closed down for the winter.⁵⁰

Increasing contact between large flying-boats and submarines in the North Sea and to the south and southwest of the English coast was one of the few encouraging features of the war for the British Admiralty.[‡] The problem of how to defend shipping remained, however. The number of allied, British, and neutral vessels sunk by submarines rose steadily from 145 ships totalling 291,459 tons in January to 354 ships totalling 834,549 tons in April. British losses alone reached their peak during 'Black Fortnight' between the 17th and the end of April when 400,000 tons of the British total of 545,000 tons for the month were destroyed by mine or sub-

* Boswell had come over early in the war in the Princess Patricia's Canadian Light Infantry and served in the trenches. Invalided home, he had recovered and joined the RNAS in Canada in June 1916. He was awarded the DSC for his part in this attack of 20 May 1917.

† Invalided in October 1916, Sussan had recently rejoined the RNAS after recuperation in Canada. C.A. Maywood of Winnipeg was also at Prawle Point; he was found unfit for further flying in August and had to resign. A third Canadian to join Prawle Point early in its history was H.L. Crowe of Toronto, who was on his first active service appointment. Returning from an emergency submarine patrol on 22 June, he crashed on the foreshore and was killed.

‡ There was in this period one noteworthy sighting and attack by Flight Sub-Lieutenant C. McNicoll of Montreal, one of the Canadians at Dundee, on 12 March 1917. The attack was unsuccessful, but McNicoll was awarded the DSC in June 1917. Two other Canadians were at Dundee at this time: J.G. Ireland of Montreal and W.R. Kenny of Ottawa, who became an Air Vice-Marshal, RCAF, in the Second World War. By early December they had been joined by F.C. Cressman of Peterborough, Ont. (lost at sea on Christmas Eve, 1917), S.A. Grant of Montreal, J.D. Guild of Kemnay, Man., C.W. Lott of Brussels, Ont. (KIA 20 July 1918), and A.H. Sandwell of Montreal. Seven out of fifteen pilots were Canadian. See McNicoll to CO Dundee, 13 March 1917, Air 1/659/17/122/607.

marine, a high proportion of these sinkings occurring some two hundred miles off the southwest Irish coast and in the western approaches to the English Channel. On 1 May, therefore, the First Sea Lord demanded ruthless control of shipping activity. The Admiralty at last began to resort to the ancient system of convoy.⁵¹

Coasters plying to the Hook of Holland had been crossing in convoy since July 1916. Large Americas from Felixstowe searched the route beforehand and accompanied the 'beef ships,' as the pilots called the cattle trade, from April 1917. The Anglo-French coal trade had been in convoy from February 1917 and convoys also ran from the Orkneys to Norway from the end of April. The anti-submarine division now recommended ocean convoy; the Admiralty accepted, not without misgivings. Although a convoy leaving Gibraltar on 10 May and met by a Large America from the Scilly Isles arrived without loss, this did not become a regular routine for another two months. On 24 May the first convoy for Britain left Hampton Roads, Virginia, but not for two months did trans-Atlantic convoys begin to sail on a regular schedule. Losses fell off initially, but because so much shipping was still routed independently and so much faith was still placed in the patrol system for detecting and destroying U-boats, the amount of tonnage sunk remained unacceptably high throughout the summer months. Pilots of seaplanes and flying-boats (except for those meeting the inwardbound convoys in the Western Approaches or those escorting the 'beef trade') simply had instructions to carry out their normal patrol, but, should they sight a convoy, to consider its protection 'as their prime task.'⁵²

Because of the difficulty of locating the inward-bound convoys, long-range U-boats had moved in to attack outward-bound shipping, which was still independently routed. As a result the first outward convoy was organized to sail on 13 August. Indeed, it was between the fall of 1917 and the spring of 1918 that the convoy system finally turned the tide of the German submarine offensive. The RNAS played its part in this triumph. Kite balloons gave such a good view that submarines could not get into an attacking position without being sighted; non-rigid airships provided the same sort of protection and could also attack submarines, although not with great effect.

At no time did statistics appear from the Admiralty that related the tonnage of shipping arriving safely in port to number of hours flown on convoy escort. The naval staff preferred to place its emphasis on the number of submarines sighted and attacked each month. It was left to an American commanding the USN Aviation Force in European Waters to observe, in a paper of February 1918, that 'The statement ... that the positive effect of patrol is measured best by the submarines that have been sunk, I cannot agree with, as it seems to me the best measure of patrol is the amount of protection afforded our shipping.' As he pointed out, 'the reason of failure to destroy is because a submarine gets ample warning and submerges; this protects friendly shipping - the object of patrol.'⁵³ There can be no doubt that the sighting of U-boats kept the adrenalin flowing and morale high, and the airmen would not likely have appreciated the possibility that the very absence of sightings might be proof that they were doing their job effectively. Seaplanes, flying-boats, and aeroplanes in the Home Stations flew 3779 patrols from July to December 1917, 362 of which were escorting convoys. During 7592 hours in the

air, eighty-six submarines were seen and fifty-eight attacked. Airships had a somewhat lower ratio of sightings to hours flown.⁵⁴

On 18 August 1917 the sole Canadian at Cherbourg, Flight Sub-Lieutenant R.T. Eyre of Toronto, sighted a submarine but was unable to attack before the U-boat submerged. A month later Flight Sub-Lieutenant W.A.N. Davern of Belleville, Ont., bombed a submarine with no apparent result during a patrol off Yarmouth. Flying out of Felixstowe, B.D. Hobbs and R.F.L. Dickey carried out an unsuccessful attack on 28 September. Another Felixstowe flying-boat bombed a submarine the next day and in October the 'War Flight' recorded three sightings, including an attack made by a machine with Flight Sub-Lieutenant H.S. Wilson of Westmount, Que., in the second pilot's seat.⁵⁵

Flight Lieutenant McGill attacked two submarines off the Isles of Scilly in October, both with inconclusive results. Flight Lieutenant Leckie at Yarmouth sighted a periscope while searching for a lost seaplane on 29 October, but was unable to make an effective attack. Four days later one of the Felixstowe pilots, J.O. Galpin, flying in broken cloud, caught sight of a submarine and carried out an unsuccessful attack. On 3 December 1917 one of the two Canadians in HMS *Riviera*, Flight Sub-Lieutenant N.I. Larter of Toronto,* unsuccessfully bombed a surfaced submarine thirty miles west-northwest of Cap de la Hague. In December Galpin and his crew made the only attack that month by a Felixstowe aircraft when they sighted two U-boats and were able to release bombs on one. At Cherbourg, just before Christmas, Eyre attacked and thus diverted a U-boat lying in wait for a French convoy off Cap de la Hague. On 20 February 1918 Leckie found two submarines and managed to attack one about thirty miles northeast of Great Yarmouth. He reported seeing the stern rise out of the water, turn over and disappear at a 60-degree angle, but once again, there is no record of a U-boat destroyed by air action. In March there were two more attacks, one by Eyre from Cherbourg and one by Flight Sub-Lieutenant H.B. Kerruish of Fergus, Ont., flying from the aircraft carrier *Campania*.⁵⁶ Naval airmen were finding enemy submarines and subjecting them to harassment, and no enemy aircraft was able to stop them.

Air supremacy in the North Sea bore some relation to home defence activities. After the long-range Large Americas started arriving they were kept in readiness at Felixstowe, Yarmouth,[†] and Killingholme to intercept zeppelins within 150 miles of the British coast. On 14 May 1917 Leckie and his co-pilot began a new and decisive phase in the campaign against German airships. Wireless intercepts had pinpointed a zeppelin on a mine-spotting patrol near the Terschelling Light Vessel and at 0500 hrs the flying boat's crew sighted their quarry fifteen miles ahead at about 3000 feet. Leckie was at 6000 feet and, ordering three of his 100-lb bombs dropped to lighten his aircraft and improve its performance, he went into a shallow dive at 90 knots, levelling out slightly astern of the airship. Twenty feet below the

* The other Canadian was B.N. Harrop of Indian Head, Sask., who served in the carrier from November 1916 to July 1918. Larter and his observer disappeared without trace on 9 December 1917.

† Canadians at Yarmouth in the summer of 1917 included G.R. Haliday of Victoria, R. Leckie and N.W. Leslie of Winnipeg, and G.H. Simpson of Toronto.

gondolas on the starboard quarter, his English co-pilot fired incendiary bullets into the airship's envelope, until his gun jammed. But as the flying-boat veered hard to starboard a small glow started to spread inside and within seconds L 22, her number clearly visible, had become a blazing torch plunging tail first into the sea. Soon all that remained was a 'mass of black ash on the surface from which a column of brown smoke about 1,500 feet high sprang up and stood.'⁵⁷ For a time the fate of L 22 remained a mystery to the Germans because Leckie had maintained wireless silence from eighty miles to seaward of his base.

In the foggy early hours of 24 May Galpin and Leckie were out again in the same aircraft to catch the zeppelins returning from a raid on England. This time they suddenly found themselves below L 40 which climbed hard to gain altitude and, according to Galpin, 'threw out a smokescreen under cover of which he gained the main bank of clouds.' By chance the episode was repeated with the same actors on 5 June when they attacked L 40, while flying the westerly patrol off Terschelling Light Vessel. Once more the Germans failed to appreciate that a new type of aircraft was involved.⁵⁸

They were still in ignorance on 14 June when L 43 went on patrol with L 23 to cover minesweepers dealing with a British minefield forty miles north of Terschelling. Following a wireless intercept, a Large America piloted by Hobbs and Dickey set out to find them. At 0840 hrs they spotted L 43 at an altitude of 1500 feet off the Dutch coast at Vlieland. 'We at once proceeded [the pilots recorded] to attack at full speed climbing to 2,000 feet ... Hobbs was piloting machine ... As we approached the Zeppelin we dived for her tail at about 100 knots. Her number L 43 was observed on the tail and bow, also Maltese Cross in black circle. Midship gun opened fire with tracer ammunition and when about 100 feet above Sub-Lieut Dickie [sic] opened fire with Brock and Pomeroy ammunition as the machine passed diagonally over the tail from starboard to port. After two bursts the Zeppelin burst into flames. Cutting off engines we turned sharply to starboard and passed over her again; she was by this time completely enveloped in flames and falling very fast.'⁵⁹

To the German command L 43 had simply vanished, but L 46 later the same day revealed what must have been the fate of the lost airship. It encountered Galpin and Leckie, who were following up the lead given by the airship's wireless messages. The zeppelin escaped by dumping water ballast and rapidly climbing to 18,700 feet off the North Hinder Light Vessel leaving the flying-boat to fire ineffectually at her from its operational ceiling, several thousand feet below. *Fregattenkapitän* Peter Strasser, Chief of the German Naval Airship Division, concluded that L 43 had been shot down by the same plane which had attacked L 46. New precautions and a minimum flight altitude of 13,000 feet were ordered for all future patrols. The result for the crews was 'that each scouting flight became as strenuous as a raid on England.' In tactical terms, the flying-boats had sharply reduced the effectiveness of the airship in its prime function, reconnaissance for British submarines and mines.⁶⁰

* All four members of the Large America that destroyed L 22 were decorated: Galpin and Leckie each got a DSO, and the two ratings received DMS.

In the early hours of 26 July Naval Intelligence recorded the wireless transmissions of L 44, L 45, and L 46 on patrol in Heligoland Bight, giving Leckie and Galpin an opportunity to finish off their old opponent L 46. At 0935 hrs they were on the tail of the unsuspecting airship which, despite orders, was flying at 10,000 feet. The sudden realization in the airship that she had unwanted company and her sudden and violent evasive action produced an electrifying spectacle for the onlookers. Leckie yelled out in amazement, 'Look Galpin! My God! She's stalled!' as L 46 threw out ballast and shot upwards with her nose at an angle of 15-20 degrees, thus escaping her attackers.⁶¹

To meet the changing pattern of air activity over the North Sea in 1917 German naval aviation was reorganized and expanded under the centralized control of a chief of naval aviation. The four main operational stations, all located on coastal islands, had their effective strength increased: List to thirty-two seaplanes, Heligoland to twenty-four, Norderney to forty-eight, and Borkum to twenty.⁶² Scouting areas of each station were divided into nine sectors with the main emphasis early in the year on surveillance and the protection of minesweeping flotillas.* When Large Americas appeared off Borkum itself, the station took on the task of providing fighting echelons while Norderney assumed responsibility for reconnaissance and guarding the minesweepers. Most of the stations' work was carried out by miscellaneous variants of the *Friedrichshafen* FF 33 seaplane; from May onwards they began to take delivery of the two-seater *Friedrichshafen* FF 49C equipped with the more powerful 200-hp Benz engine and armed with two machine-guns. Another new arrival in 1917 was the two-seater *Brandenburg* W 12 fighter seaplane designed by Ernst Heinkel, whose 150-hp Benz engine gave it a top speed of 100 mph, faster than any of its British counterparts. An excellent climber, fitted with guns fore and aft, the W 12 was designed specifically with the ability to fire rearwards in contrast to the earlier single-seat Rumpler, Albatros, and Brandenburg types which made up the bulk of fighter defence forces.⁶³

In May German fighter seaplanes began to launch attacks on Large Americas. N.A. Magor figured in one of these incidents on the 19th. On 4 July the Germans introduced a more effective alternative by bombing Felixstowe with fourteen Gothas. They successfully gutted a flying-boat, seriously damaged another, and killed eight of the personnel, but once surprise had been lost a second raid on the 22nd failed to make any impact.⁶⁴

The RNAS, no longer able to reach the higher flying zeppelins with Large Americas, in early September tried using a DH4[†] and a flying-boat in mutual support. On 5 September Leckie was the pilot of a Large America, taking with him Squadron Commander V. Nicholl, the overall commander of the experiment. They made contact with L 44 and L 46 but had to break off the engagement when

* General allocation of responsibilities was divided up regionally: List was responsible for regions in front of the Danish coast; Heligoland and Norderney for the open sea to the middle of the North Sea; and Borkum for regions in front of the Dutch coast. G.P. Neumann, *The German Air Force in the Great War* (London 1920), 267-8

† Two DH4 bomber reconnaissance aircraft (powered by a Napier-built 200-hp RAF engine and fitted with extra large tanks to give a fourteen-hour endurance) had been sent originally to Yarmouth for a photographic reconnaissance flight west of the Kiel Canal.

the DH4's engine faltered, and as they did so their own machine received shrapnel damage from the anti-aircraft fire of a German naval force of cruisers and destroyers below. The engine of the DH4 soon stopped entirely, and eventually the aircraft 'pancaked' heavily onto a breaking sea some fifty miles from home. Nicholl and Leckie were also having trouble with an engine that promised, at best, a hair-raising trip back. Despite the certainty of not being able to get airborne again, 'Bob Leckie simply shoved the nose of 8666 down and went straight for Gilligan and Trewin.' For the next three-and-a-half hours Leckie taxied towards Yarmouth before running out of fuel. Half-a-dozen seasick men without food and short of water were now adrift in a damaged flying-boat that required constant bailing to stay afloat. As Nicholl tersely described it in his official report: 'We then drifted from 7 p.m. on the 5th to 2 p.m. on the 8th ... when we were picked up by HMS *Halcyon* and towed to Yarmouth.'⁶⁵ Nicholl and Leckie were each awarded the DSO.

Another example of determined seamanship occurred on 1 October. After Hobbs* skilfully manoeuvred a Porte flying-boat for twenty minutes off the North Hinder in a running fight with two seaplanes and an aeroplane, both engines stopped, forcing him to come down. After being raked once more by the departing Germans, the crew of the Porte was left to patch up and start a laborious crawl back on the surface. They were taken in tow close to the English coastline nine hours after the action.⁶⁶

Although naval forces concentrated for the most part in British home waters and RNAS activities (especially for Canadians) were largely centred there, important naval and air elements in the Mediterranean were committed, also, to the Italian, Balkan, and Turkish war zones and to the maintenance of the direct sea route to the East. Canadians in the Mediterranean were less numerous and formed a smaller proportion of aircrew,[†] but were to be found in every phase of operations. Throughout the period the naval air service in this theatre was somewhat of an orphan, receiving equipment and even some personnel that were not wanted in France or England. Wing Commander Samson, for example, had been sent to Port Said in 1916 under a cloud. Using the seaplane carriers *Ben-my-Chree* (sunk in February), *Empress*, *Anne*, and *Raven II*, his aircraft flew bombing, reconnaissance, and spotting sorties mostly in the army support role until November 1917.[‡] Commodore Murray Sueter, who in December 1916 had proposed a carrier-borne raid by torpedo seaplanes on Wilhelmshaven or an attack from Italian land bases on the Austrian fleet in the Adriatic, received an appointment in January 1917 to command the new 6 Wing, which included British aircraft in the Adriatic. This not

* Hobbs was well recognized for his work at Felixstowe: he was awarded the DSC on 22 June 1917, the DSO on 20 July 1917, a Bar to his DSC on 30 November 1917, and Mentioned in Despatches on 17 November and 19 December 1917. He was chief instructor in flying-boats for many British, Canadian, and, later, United States naval pilots.

† Only in the Aegean did figures compare with the northern theatre. At the beginning of 1917 14 of the 52 pilots there were Canadians. By April 1918 there were 22 of a total of 100. Great Britain, Admiralty, *Navy List* (London 1917-18), 1, 431-1X, 1A, 1119-53

‡ At various times in the year pilots M.C. Dover of Winnipeg, F.C. Henderson and T.G.M. Stephens, both of Toronto, and observer D.P. Rowland of Winnipeg flew under Samson. For the army support role in Macedonia, see chapter 15.

only removed Sueter from the Admiralty, where he had become something of an embarrassment, but also gave him a chance to put his ideas into practice.⁶⁷

The chief concern in the Adriatic was to prevent German submarines getting out into the Mediterranean from Austrian ports, principally Cattaro. As they did in the Straits of Dover, the naval forces available laid down a mine barrage outside the enemy base (in this case across the Straits of Otranto), patrolled by trawlers and drifters. But the Otranto barrage was even less successful than that in the Straits of Dover. Under the 1917 air establishment, six Canadian pilots and one engineer were among the personnel sent to form 6 Wing. The wing was given a dozen Short and Sopwith Baby seaplanes for barrage work, twelve torpedo-carrying Shorts, six two-seater aeroplanes as escorts, and six Shorts for the torpedo training school at Malta. In June Flight Lieutenant John A. Barron of Stratford, Ont., brought out a special detachment to rig and test six SS airships sold to the Italians and to give flying instruction. He remained in command of the detachment at Grottaglie Aerocalo near Taranto until January 1918. Another five Canadians joined the wing towards the end of 1917.* The results, however, were not spectacular. By the end of the year the Otranto air patrols had sighted eight submarines and attacked six of them, but U-boats continued to navigate the Straits, particularly by night. In the autumn Sueter's plan to raid Cattaro failed because of bad weather, and all efforts thereafter went towards patrolling the barrage, there being only six operational aircraft left by 15 December.⁶⁸

In the Aegean, 2 Wing, with seventy-six aeroplanes, continued the tasks developed in 1916. 'A' and 'D' Squadrons based on Thasos and Stavros were employed on reconnaissance and bombing in southern Bulgaria and the Lower Struma; 'C' Squadron, based on Imbros, flew similar missions over Turkish territory; 'B' Squadron at Thermi on the island of Mitylene flew anti-submarine patrols and harassed the Smyrna area. In the spring 'B' and 'C' Squadrons were reduced to half strength to create 'E' Squadron (four two-seater Sopwith 1½ Strutters and a Sopwith Triplane) based on Hadzi Junas and 'F' Squadron (single-seater Sopwith 1½ Strutters) on Amberkoj and later Marian aerodrome to support the army on the Macedonian front. By mid-summer 'G' Squadron (Henri Farmans) was established at Mudros for night bombing and A/S patrols. The seaplanes of 2 Wing flew from Stavros, Thasos, and HMS *Ark Royal* until a slipway was constructed at Mudros. The SS airships were based on Kassandra and Mudros. In February a four-seaplane unit was established at Suda Bay, Crete, both for submarine patrols and to watch for any attempt by the *Goeben* to break out of the Dardanelles.[†] During the year there

* Canadians who went to 6 Wing during the year included J.R. Bibby of Niagara Falls, Ont., who went from Gibraltar (KIA at Malta, 11 June 1917), M.G. Dover of Winnipeg and F.C. Henderson of Toronto, after the sinking of *Ben-my-Chree*, W.C. Ault of Toronto, G.H. Boyce of Ottawa, F.E. Fraser of Winnipeg, E.G. Hellwith of Allandale, Ont., W.H. Mackenzie of Victoria, H.G. Raney of Ottawa, and E.C.R. Stoneman and F. Wood of Toronto. A.R. Layard of Saanich, BC, the wing engineer, was later awarded the OBE for his work at Taranto. By April 1918 five of forty-one pilots were Canadians.

† Some of the Canadians who have been identified in these squadrons and units were: 'A' Squadron, G.T. Bysshe of Ottawa (POW 17 Feb. 1917), J.M. Ingham of Toronto (KIA 30 March 1917); 'C' Squadron, J.R.S. Devlin of Ottawa, A.G. Woodward of Victoria; 'G' Squadron, D.M. Ballantyne of Montreal, Angus D. Macdonald of Ottawa; Seaplane Unit Suda Bay, R.E. Spear of Winnipeg and F.P.L. Washington of Hamilton.

were various modifications to these arrangements, particularly when a Handley Page 0/100 arrived in July. The Handley Page carried out several long-distance flights under the control of its regular first pilot, J.N.W. Alcock, who later made the first non-stop trans-Atlantic flight. On the night of 30 September, with Flight Sub-Lieutenant Hugh Aird* of Toronto as his second pilot, Alcock failed to return from a trip to Constantinople. The two became prisoners of war.⁶⁹

By far the most significant event in 2 Wing's history in this period was the breakout of *Goeben* and *Breslau* from the Dardanelles on 20 January 1918. The situation offered a golden opportunity for the RNAS to launch air attacks on a capital ship. Although *Breslau* was sunk by mines, *Goeben* had gone aground on a sandbank while under air attack by DH4s from Imbros and Mudros and presented a tempting target. For eight days and nights, therefore, under generally poor weather conditions, there were 270 sorties in which over fifteen tons of bombs – some of them 112-pounders – were unsuccessfully dropped.⁷⁰ On 25 January HMS *Manxman* arrived from England with two 320 Shorts and 18-inch aerial torpedoes. The next day, however, before the weather cleared and torpedoes could be launched against her, the *Goeben* was towed off the sandbank.⁷¹ The failure to do any significant damage did nothing for the reputation of the RNAS in the Mediterranean theatre.

The *Goeben* episode represents rather well the problem of the naval air service. In its dying days the RNAS had begun to establish the importance of the air in naval warfare, but resistance to innovation was still to be found among senior officers, who rightly pointed out that the capacity of aircraft to achieve the destruction of enemy ships and submarines had yet to be proven. Beatty, commanding the Grand Fleet, and Wemyss, the First Sea Lord, were willing to experiment, but they were the victims of events. In taking on all sorts of unrelated tasks in almost every theatre of war, the RNAS had sown the seeds of its own destruction. Nevertheless, by the time that it was incorporated into the new Royal Air Force it had grown from its handful of men and planes in 1914 to a force of 55,066 personnel⁷² with 2949 aeroplanes and seaplanes.⁷³

The demise of the RNAS was regretted by the aircrew rank and file, to whom the Canadians belonged, but principally for sentimental reasons. 'It was a sad

* The son of Sir John Aird, General Manager Canadian Bank of Commerce, Hugh Aird was one of two brothers in the British air services, the other serving in the RFC.

† Canadians involved in this episode included C.G. Bronson of Ottawa (POW 28 Jan. 1918), A.S. Girling, address unknown, W. Johnston of Quebec (shot down in flames, 20 Jan. 1918), F.J. Mackie of Winnipeg, C.E. Moore of Fort William, Ont., and D.F. Murray and A.G. Woodward, both of Victoria. Bronson, flying a seaplane from HMS *Empress*, was shot down but won the DSC for his efforts on 28 January in creating a diversion to permit a submarine to get through the *Nagara*, before it was realized *Goeben* had been towed off.

‡ It has been established that 807 Canadians enlisted in the RNAS and 279 were killed, died, or were released during the war. There were therefore at least 528 Canadians (about 10 per cent of the officers) in the service as of 1 April 1918, but it has been possible to identify by name only 341 who were on the strength of operational or training squadrons. Canada, National Defence Headquarters, DHist, 'Statistical Printout of File by Province, by Year of Enlistment, by Service, in Computer Programme of Biographical and Service Information Concerning Canadians in the British Flying Services, Canadian Forces Computer Centre, TCAA-2.'

moment,' wrote Raymond Collishaw, 'when my squadron had to strike the Royal Navy ensign ... which we had proudly flown even when we were serving with the army on all its fronts.'⁷² Sentiment aside, the airmen were still in their element. The RNAS experience would make its mark on them, the Royal Air Force, and the future Royal Canadian Air Force.

Aviation and the Victory over the Submarine

A German naval policy that gave top priority to the U-boat campaign against allied shipping forced the British in 1918 to divert their principal efforts to counter-measures. For the majority of Canadian pilots and observers on maritime flying this meant that they would be involved in operations concerned directly or indirectly with the defeat of the submarine in all theatres, whether by offensive air patrolling, convoy escort, or tactical bombing. The maximum force was to be deployed against the enemy's submarines.

Airmen in ships of the Grand Fleet or in carriers, which remained under complete naval control, were largely unaffected by the change. Those ashore at air stations became part of a new air structure subdivided by area, group, wing, and squadron. Outwardly there were few signs of the new régime. The daily routine went on as before, under the same leadership. All were allowed to wear out their old RNAS and RFC uniforms, a ruling which was freely interpreted by the airmen of the period, giving most RAF units a motley and impromptu appearance.

For the Royal Navy the creation of the RAF meant that it was now dependent upon the Air Ministry for the design and supply of aircraft to meet its commitments. Airships were excepted, through a private arrangement between the First Lord of the Admiralty, Sir Eric Geddes, and the Secretary of State for Air, Lord Rothermere. Although the appointment of Fifth Sea Lord had been abolished, the Admiralty still required an establishment to deal with air policy and organization and to work with the Air Ministry. Captain F.R. Scarlett was appointed Director of the Air Division with the rank of brigadier-general. Since Scarlett was under Rear-Admiral Sydney Fremantle, the Deputy Chief of the Naval Staff, the air arm once more had no direct voice on the Board of Admiralty. By 1918, however, aviation had become an integral part of naval planning. At this stage the Admiralty's attitude toward the RAF was co-operative; it was clearly interested in making the new service a success.

By the end of April the Air Ministry was in disarray, Rothermere and most of his Air Council already having resigned. Admiral Mark Kerr's departure because of 'certain differences on matters of strategy' with General Trenchard, briefly Chief of the Air Staff, and the temporary abolition of the post of deputy chief, were of particular significance to the navy. The Master-General of Personnel, Major-General G.M. Paine, was now the only council member with a naval background. The new Air Minister, Sir William Weir, and the new Chief of Air Staff, Major-

General F.H. Sykes, were both strong advocates of a strategic bombing policy for the RAF, and that role received prime emphasis in Weir's first policy statement on 23 May. The navy could take some comfort from Weir's promise that forces operated independently by the Air Ministry would be allocated to the army or navy should the need arise, and more particularly from his recognition of 'the necessity of quickly strengthening the anti-submarine aircraft patrols.'¹

Grand Fleet operations in 1918 were dictated primarily by the anti-submarine war. Beatty reluctantly abandoned his policy of 'seek out and destroy' for his main units and reverted to one of 'watching and waiting,' as earlier practised by Jellicoe. As Beatty explained it:

... the correct strategy ... is no longer to bring the enemy to action at any cost, but rather to contain him in his bases ...

This does not mean that an action should be avoided if conditions favour us or that our role should be passive.²

Beatty and the Admiralty agreed to build up existing mine programmes in order to curb the High Seas Fleet and help in destruction of U-boats. The Heligoland Bight fields were to be extended; the Northern Barrage between Scotland and Norway was to be completed; the mine barrier across the Strait of Dover was to be strengthened. The relation of these plans to overall strategy was outlined in the naval policy statement approved by the War Cabinet on 18 January: '... these mine fields will, in the opinion of the Board, very materially hamper the movements of enemy submarines and surface craft ... At the same time, the consequent release of destroyers and auxiliary craft at present employed ... in the Dover Channel, will enable minor offensive operations to be undertaken, will release forces for submarine hunting, will ease the strain on the destroyer forces of the Grand Fleet, and will materially improve the shipping situation between England and France.'³ The naval planners also hoped that the continuous movement of patrolling aircraft and minelayers with their escorting ships would generate action with German mine-sweeping forces. In addition, they envisaged renewed air-sea attacks on enemy-held Flemish ports.

In mid-April Beatty brought the Grand Fleet south to the Firth of Forth to shorten the steaming time to the southern reaches of the North Sea. Rear-Admiral R.F. Phillimore, the Admiral Commanding Aircraft, exercised full administrative control over heavier-than-air units ashore and afloat, and was adviser and deputy to the Commander-in-Chief for aviation. He himself was in the newly-commisioned *Furious*; the other units in the carrier squadron at Rosyth were *Pegasus*, *Nairana*, and *Campania*.⁴

The Grand Fleet was changing from seaplanes to aeroplanes for reconnaissance. On 3 November successful flights from *Campania* by the two-seater Sopwith 1½

* At this time only eight Canadian RAF officers were on the establishment of the Grand Fleet: two as aeroplane pilots, three as seaplane pilots, and the others as balloon observers. The aeroplane pilots, G.W.J.G.J. Dunn of Winnipeg and H.D. Jack of Toronto, were taking advanced training at East Fortune. George Breadner of Winnipeg and H.B. Kerruish, of Fergus, Ont., both on the books of *Campania*, and F.G. Hellmuth of Allandale, Ont., at Rosyth, were seaplane pilots. G.B. Carr and L.G. Gallwey, addresses unknown, and A.B. Hopper of Ottawa, were balloon observers.

Strutter had paved the way for its replacement of the Short seaplane as a shipborne reconnaissance aircraft. *Furious* received a squadron of fourteen 1½ Strutters in March. When on 4 April a fully-loaded Sopwith was flown off the forward turret of the battlecruiser *Australia*, the Operations Committee decided to supply battlecruisers, and later two ships in each division of a battle squadron, with a reconnaissance aeroplane forward in addition to a fighter aft.⁵

The rest of the carrier squadron lagged behind *Furious* in the switch to aeroplanes.* The aging *Campania*, while undergoing refit at Scapa Flow, was at the bottom of the pecking order and retained her Fairey Campania seaplanes. These aircraft had been specially designed as carrier-borne reconnaissance machines and were still capable of useful work. Operating with the Northern Patrol off the Orkney Islands in March, H.B. Kerruish of Fergus, Ont., and his observer spotted the wash caused by the conning tower of a surfacing U-boat about eight miles ahead. Increasing to the Fairey Campania's full speed of 80 knots, they dropped two 100-lb bombs from 800 feet ahead of the swirl made by the target as it crash-dived. Kerruish 'considered the bomb exploded either directly over or very close to the submarine.'⁶ But nothing came up. German records show that no submarine was either sunk or damaged anywhere in the area during this period.

Unless they were drafted directly to the three older carriers, aeroplane pilots joining the fleet were appointed on paper to *Furious*. Many were recent graduates chosen for their good landing records during initial training. The route followed by Lieutenant G.W. Dunn of Winnipeg was typical. On 11 March he arrived at East Fortune Air Station on the south shore of the Firth. Like other new pilots, he practised landing on a simulated ship's deck painted on the runway.[†] In June he was transferred to Turnhouse, an RAF station closer to Rosyth that was the main supply depot for fighters as well as a pilot pool. From this base Dunn completed his final test of flying a fighter off the deck of *Pegasus* five times.[‡] He then joined *Birkenhead* of the 3rd Light Cruiser Squadron as her turret pilot.⁷

under the orders of the Admiral Commanding 2nd Battle Squadron. R.F.J. Dixon and R.M. Walkey, both of Toronto, were aeroplane pilots who served with the Grand Fleet in the last few months before the Armistice. Later arrivals among seaplane pilots were N.J. Laughlin of Belfountain, Ont., and H.R.F. Richardson of Ottawa in *Pegasus*, and G.H. Simpson of Toronto, a veteran carrier pilot, in *Nairana*.

* The first official use of the generic term 'aircraft carrier' appears to have been made by Scarlett in a minute for transmission to the Air Ministry on 4 May 1918. The Admiralty confirmed it by Interim Order to the fleet at the end of the month, substituting the designation 'Aircraft Carriers' for 'Seaplane Carriers' because the latter 'now carry both Seaplanes and Aeroplanes.' The Admiralty's instructions have been omitted from Roskill's discussion of the subject. Scarlett to DSD, 4 May 1918, Air 1/277/15/226/126 pt 1; Confidential Admiralty Interim Order 2592, 31 May 1918, confirmed by Confidential Monthly Order 2592, July 1918; S.W. Roskill, ed., *Documents relating to the Naval Air Service, I: 1908-1918* (London 1969), 668.

† M.C. Dubuc of Montreal, an experienced Canadian carrier pilot, served at East Fortune in 1918, apparently as an instructor. Two Canadians died there: F.A. Cash as the result of a 'spinning dive' on 25 July 1918 and E.F. Kerruish on 13 July 1918. Both were from Hamilton, Ont.

‡ It was Dunn who flew the first Sopwith 2F1 Camel off *Pegasus*. Unlike the land-based Camel, this fighter had a detachable rear fuselage for close stowage. Designed to engage zeppelins over the North Sea, it mounted a single Lewis gun over the wing centre section and a fixed synchronized Vickers above the fuselage.

By mid-summer the Grand Fleet had a substantial fighter force of thirty-four aircraft. The fleet's fighter pilots, among whom were a number of Canadians, were supposed to operate in pairs of flights during action. At first, tactics were rudimentary and group leadership in the air was determined by ship seniority.* Thus, Second Lieutenant W.S. Lockhart of Moncton became the flight commander over four or five pilots in the 4th Cruiser Squadron because *Sydney* was flagship, his responsibility being to lead them in 'loose formation' back to shore base when the fleet returned from exercise or operations. Later, the effort was made at Turnhouse to weld the Camels into useful tactical groups. Each air unit practised getting off together from its ship squadron and assembling overhead in two formations of eight aircraft.⁸

The care and handling of their aircraft on shipboard was a responsibility the young Canadian pilots had to accept. Too often, they found, over-enthusiastic mariners were inclined to treat their machines as stoutly-built picket boats. One pilot complained that 'a large petty officer was allowed to walk right through the top plane ... when trying to unhook the purchase and was only extracted with much difficulty.'⁹ The pilot had to work closely with the turret officer and his gun crew, since once the Camel was on the platform they became the 'flight deck party.'

Taking off from a gun turret platform was a tricky affair. The procedure involved the ship's commander, other officers on the bridge, someone to take the wind pressure, and the aircraft's mechanic as well as the pilot. W.S. Lockhart had a vivid and precise recollection of the routine. When the aircraft, attached to the deck by cables ending in a quick release shackle, was in flying position the pilot and mechanic got the engine turning over. It was important to warm up the engine thoroughly despite the frequent impatience of the captain; otherwise the pilot might find himself moving down his twelve-foot runway with an engine barely ticking over. Once the engine was warm and the rpms and oil pressure in order, it was necessary to be dead into the wind, with at least twenty knots of wind pressure. 'I always figured if 20 knots would take you off,' Lockhart recalled, '24 knots ... would take you off better.' He went on:

The Snotty [midshipman] reports to the Commander an 18 knot wind pressure. The Commander says to me, '18 knots.' I answer, 'The ship will have to steam ahead 6 knots more.' He says 'How do you want your platform trained?' I say, '3 points green' ... The bridge is right behind me and up about 8 feet, but I can't talk to the bridge. The Commander tells the bridge to steam ahead 6 knots faster and train the platform 3 points green. You feel the ship going ahead and the platform moves to starboard. Then the Snotty reports to the Commander '24 knots.' I nod O.K. to the Commander, I try my ailerons, I try my rudder, my oil

* Serving aboard turret ships at various times during 1918 were H.E. Cooper of New Westminster, BC, in the light cruiser *Comus*; W.D.E. Donaldson of Ottawa in *Comus* and the battleships *Barham* and *Marlborough*; V.S. Grigg of Toronto in the battlecruiser *New Zealand*; N.J. Laughlin of Belfountain, Ont., in the battleships *Emperor of India* and *Orion*; W.S. Lockhart of Moncton, NB, in the Australian light cruiser *Sydney*; C.B. Rutherford of Toronto in the battlecruiser *Indomitable*. In addition, a Canadian observer officer, A.W. Green of Fort Saskatchewan, Alta., flew from the heavy cruisers *Courageous* and *Glorious*, as well as the battleship *Bellerophon*.

pressure is all right, my RPM is all right, I set my stick a little forward. I want to nose down a little to start with. I hold everything as is. I raise my left hand high. The Commander raises his white flag and my mechanic is watching him under the fuselage. I drop my hand back into the cockpit. The Commander lowers his flag. Birch [his mechanic] sees the signal and he pulls the trip cord. For the next two seconds you don't know what has happened but you soon discover you are out there flying an aeroplane.¹⁰

Even at nearly full revolutions the aircraft sank perceptibly after leaving the platform. That was the signal for the pilot to pull back on the stick and begin the long climb to join his companions from the squadron.

Getting off from a gun turret was hazardous enough, but the recovery procedure after landing in the sea was full of risk as well. *Furious* was supposed to cut through this problem, but she turned out to be a disappointment.* The effects of the disturbed air conditions over her new after-landing deck, caused by funnel fumes and the mass of midships superstructure, were too much for her pilots. Of sixteen experimental landings, thirteen ended in crashes. Clearly the exponents of a flush-deck carrier were right. Pilots were given the option of either landing on deck or returning to the procedure of ditching near a destroyer. No one seems to have chosen the former.¹¹

Much of the airmen's time at sea in 1918 was taken up with tactical exercises in fleet action. Ordinarily the battle fleet's advanced anti-submarine escort was provided by coastal airships from east-coast stations.[†] Otherwise a single Sopwith 1½ Strutter ranged ahead of the light cruiser line, in communication directly with the flagship on the Admiralty's new continuous wave wireless set. Kite-balloon observers from the light cruisers also passed early warnings to the Commander-in-Chief.[‡] The rest of the scenario called for the turret-launched fighters to be ready on their platforms in case scouting zeppelins were spotted, while five 1½ Strutters were to be in the air reporting the movements of the German battle line should a fleet action occur.¹²

In late April they got their chance. The first indication that the High Seas Fleet was stirring came from two flying-boats of Great Yarmouth, which had been sent out on the 20th to investigate the Heligoland Bight because of heavy wireless traffic from Wilhelmshaven to its minesweepers. At 1045 hrs the flying-boats, both under the operational command of Captain Robert Leckie, sighted four destroyers and four minesweepers near the Terschelling Light Vessel. Within another quarter of an hour they spotted two battlecruisers, 'probably *Derfflinger* and *Moltke* ... in

* The first Canadian in 1918 to be part of the flying complement of *Furious* was H.E. Cooper of New Westminster, BC. He was followed by B.E. Barnum of Kingston, Ont., G.H. Boyce of Ottawa, R.W. Frost of Hamilton, O.P. Gosling of Brandon, Man., R.F. McRae of Niagara Falls, Ont., D.J. Munro of Montreal, and R.M. Walkey of Toronto.

† There were four coastal airship bases, and a Canadian served at each: J.P. Haworth, address unknown, an airship technical officer at East Fortune; J.O. Hoddart of Port Glasgow, NS, at Longside; J. Sproston of Montreal at Howden; R.F.E. Wickham, address unknown, at Pulham.

‡ The four Canadians on Grand Fleet Kite Balloon duty in 1918 spent most of their time in battleships. L.B. Calnan of Picton, Ont., in *Ajax*; G.B. Carr in *King George V* and *Resolution*; L.G. Gallwey in *Erin* of the 2nd Battle Squadron; A.B. Hopper in *Erin* and *St Vincent* of the 4th Battle Squadron.

company with two four-funnelled ... cruisers, probably *Stralsund*-class ... two small three-funnelled ... cruisers, probably *Pillau* and *Gradenz*, eight destroyers ... course east, destroyers zig-zagging at 20–25 knots.¹³ As he turned for base, Leckie brought his machine down to 4500 feet in order to circle the first party of destroyers while his observer took photographs and passed derogatory signals to the enemy on the Aldis lamp. Although sighting reports were immediately signalled back to shore, the home station failed to pick them up, and it was not until the F2As returned to Great Yarmouth at 1410 hrs that the information was passed to Harwich Force.¹³

Throughout 1918 aircraft and fleet units co-operated in the closing off of the Heligoland Bight. To that end 129 new minefields, comprising 21,000 mines, were sown, and air patrols kept the minefields under observation.* These patrols provided regular reports of ship movements in the Bight; unfortunately, air and sea elements did not always co-operate effectively in making the best use of the information which was obtained with such difficulty.¹⁴

The patrolling of the Bight and the adjacent waters of the North Sea was initially the business of flying boats. Under Scheme 'A' of the standing orders issued in February, F2As were transported on lighters supported by naval forces to the chosen area if it was outside a radius of 150 miles from Great Yarmouth.[†] Inside that range they flew directly from east-coast bases, as laid down in Scheme 'B'. By May aeroplanes from *Furious* were covering the northern and eastern sections of the minefield, while flying boats from Yarmouth and others launched from lighters were patrolling the area near Terschelling and the western Bight, respectively.¹⁵

German efforts to combat British excursions into the Bight were helped by an outstanding new seaplane, the Brandenburg W 29, first put into service at Zeebrugge in April and now flying out of these bases. Fast and manoeuvrable, this fighter was designed by Heinkel as a monoplane version of the Brandenburg W 12 with a similar 150-hp engine and gun armament. Because the W 29 had a short range, its pilots adopted the tactics of alighting on the sea to await enemy sightings reported by aircraft with longer ranges.¹⁶

The first reconnaissance mission under Scheme 'A' took place on 12 March and the three flying-boats involved were under the command of Flight Lieutenant

* This was not simply an exercise in bluff to convince the Germans that information on sweeper movements came from aircraft, when actually it came from the naval intelligence division. (Cf H.A. Jones, *The War in the Air: being the Story of the Part played in the Great War by the Royal Air Force*, vi (London 1937), 351.) Beatty had been much shaken by Room 40's inability to forewarn him of the German sortie in April: '... we must reconsider the outlook which permits apparently considerable Forces indeed the *High Seas Fleet* to get out without our knowledge – otherwise we might meet with a disaster of some magnitude over this cursed convoy supporting Force.' As Marder makes clear, never again did Beatty feel he could rely fully upon naval intelligence. Beatty to Wemyss, 26 April 1918, in A.J. Marder, *From the Dreadnought to Scapa Flow: the Royal Navy in the Fisher era, 1904–1919*, v: *Victory and Aftermath, January 1918–June 1919* (London 1970), 155

† These lighters were designed for an Anglo-American bombing offensive against German naval bases in 1918. The vulnerability of Large Americas and their supporting ships and the technical progress made with long-range bombing aeroplanes caused this scheme to be scrapped. 'Memo on Seaplane Offensive against German North Sea Bases' [3 Dec. 1917], Air 1/465/15/312/151; Nicholson to Sims and enclosed staff memorandum, 18 Dec. 1917, DAD memorandum [Aug. 1918], Air 1/652/17/122/519; DAD memorandum, 20 June 1918, Air 1/283/15/226/135 pt II

N.A. Magor of Westmount, Que. The F2As were launched south of the Haaks Lightship; once airborne, Magor led them around Terschelling into the Bight. As they were photographing minesweepers at work, two of the Borkum fighters rose to the attack. Magor's second pilot quickly sent one seaplane down in flames while another Canadian, Flight Lieutenant C.J. Clayton of Victoria, forced the other to return to its base. But the enemy had scored some hits. For an hour Magor had to fly on one engine as his engineer climbed out on the wing to repair a water-pipe pierced by gunfire. After five-and-a-half hours in the air, Magor brought his formation safely to Felixstowe at 1230 hrs. Nineteen days later a similar enterprise took place, the flying-boats led this time by Flight Lieutenant J.O. Galpin of Ottawa. Though shadowed for a while by two seaplanes, there was no air action, and Galpin's pilots eventually used up their ammunition raking the decks of a flotilla of minesweepers.¹⁷ As a direct result of these patrols British minelayers re-sowed the area in which the Germans had been seen at work.

In early May the aerial contest over the waters of the Bight spread to the zeppelins. On 10 May L 56 from Wittmundhaven and L 62 from Nordholz set out on a routine patrol, the first to the west, and the second to the northern area. In Whitehall the Admiralty began to pick up their signals, and at 1008 hrs it was clear that one airship was heading westward. At 1320 hrs an F2A from Killingholme, commanded by Captain T.C. Pattinson and with Captain A.H. Munday of Toronto* as second pilot, took off to intercept. At 1630 hrs, fifty miles north-northwest of Borkum Reef, they sighted a zeppelin some 2000 feet higher than their own altitude of 6000 feet. As Pattinson opened full throttle to climb, the airship jettisoned bombs and fuel tanks and shot upward, while Munday and the engineer kept up a brisk fire. After a chase of over an hour, Pattinson broke off the action seventy miles northwest of Heligoland because of shortage of fuel and engine trouble. The F2A alighted briefly, though half-a-dozen German destroyers were converging upon it, to allow the engineer to repair a broken pipe. The crew last sighted the zeppelin 'headed for Holstein ... emitting much smoke.'¹⁸

Pattinson and Munday were credited with the destruction of L 62, which German records show to have been lost at sea on 10 May. However, we now know that the zeppelin pursued by the Killingholme crew was L 56. The airship's report was that the F2A was never within range, and that the only effect of the attack was to cut short the patrol because of loss of fuel. L 62 was seen by surface craft, patrolling northwest of Heligoland, to enter a cumulo-nimbus cloud at 1005 hrs. She shortly afterwards blew up, and her burning halves fell into the water almost

* Albert Henry Munday, born in Melbourne, Australia, the son of an English Lawyer, was a reporter for the Toronto *Telegram* at the time he joined the RNAS in 1916. His educational background included Eton College, St Boniface College, Manitoba, and Queen's University at Kingston. (After the war he took a doctorate at Columbia University.) While on active service, Munday published *The Eyes of the Army and Navy: Practical Aviation* (New York and London 1917), an informative and reliable guide to every aspect of airmanship, including contemporary tactics. A prolific writer in a number of fields after the war and one of the founders of the Toronto Flying Club, Munday published an updated and expanded version of his 1917 guide at the beginning of the Second World War (*Practical Flying in War and Peace*, Toronto 1940). His brothers W.A. and E.R. Munday (kia 5 Aug. 1918), also from Toronto, served in the RAF as well.

hitting the trawler *Bergedorf*, which picked up five bodies. Strasser thought that lightning was the most likely cause of the disaster.¹⁹

On 30 May a flying-boat from Yarmouth was forced down with engine trouble in the Bight and was destroyed by five German seaplanes from Borkum. Leckie, accompanied by another Canadian, Lieutenant W.H. Comstock of Brockville, Ont., who was acting as his gunlayer, conducted a fruitless search for the missing aircraft. This was the first long night flight by a flying boat over the North Sea. On his return Leckie landed at Yarmouth's foreshore with the aid of flares. Less than a week later he led another foray into the Bight that precipitated the largest seaplane action of the First World War.²⁰

The ostensible object of this enterprise was to investigate heavy wireless-telegraphy traffic apparently emanating from airships off the Texel, but suspected to be a ruse to lure flying boats on routine patrols into a trap. On Leckie's suggestion a strong force of two F2As from Yarmouth, and two F2As and an H12 from Felixstowe, set out on 4 June to 'deal with the situation in the appropriate manner.' At 1520 hrs, when off Terschelling, an F2A was forced to alight with a burst feed pipe. The rest were left to contend with five seaplanes of the 'dear old Borkum crowd,' one of which went back for help. At 1630 hrs 'a compact swarm of black specks [appeared] ... on the western horizon, which ... proved to be about 15 or 16 seaplanes flying low.'²¹

The two forces met head on. According to the testimony of other pilots, Leckie, leading his formation straight through, carried away 'the wireless aerial of his boat on the top plane of the leading enemy machine.' The RAF formation then wheeled to port in line ahead to cut off the German right wing of three seaplanes. In the ensuing melee 'the air was thick with the smoke from tracer bullets' and the pilots of the lumbering flying-boats had a hard time following Leckie, 'who was in and out all over the place.' When the Germans finally retired to Borkum at least one and possibly two of their number had been shot down, while the British had lost the F2A that had gone down off Terschelling and the H12. Both crews were interned by the Dutch. Leckie's leadership and tactical skill had extricated three of five aircraft from the trap so astutely laid for the patrol. But as he pointed out to his CO, three of five boats had suffered from engine failures: '... it is obvious that our greatest foes are not the enemy but our own petrol pipes.'²²

Pilots flying from turret-platforms also took part in the struggle for air supremacy over the Bight. Aircraft from Harwich Force and from Grand Fleet units, as well as from *Furious*, were frequently so engaged. The most spectacular of these strikes was an attack on the Tondern Airship Station by Camels each carrying two Cooper 60-lb bombs specially made for the raid. After bad weather had halted two earlier attempts, on 19 July *Furious* launched her Camels from a position eighty miles northwest of the zeppelin base. The Germans at Tondern were defenceless; their protective force of five Albatros D-IIIIs had been taken away on 6 March. L 54 and L 60 went up in smoke from direct hits upon the huge 'Toska' hangar. A second wave of three Camels arrived over the target ten minutes later. Their bombs, dropped from a hundred feet, destroyed the base's captive balloon. Of the six pilots to reach the target, one was lost in the sea on the way back, three landed in Denmark, and two rejoined the fleet.²³

The Tondern raid was an important event in the history of naval aviation. From it stemmed the evolution of the aircraft-carrier technique used so successfully, for example, by the United States Navy against Japan during the Second World War. Its effects were immediate. Senior British naval officers began at once to plan for a second raid, using DH9s with extra tanks and detachable wings, the target to be Ahlhorn. For their part, the Germans relegated Tondern to an emergency landing ground and cleared the pine forests around Nordholz to prevent them from being set on fire. Only Ahlhorn, because of its distance from the sea, was now considered to be reasonably safe.²⁴

The German Naval Airship Division made a direct and aggressive response when on 1 August L 70, the first of a new type of extended airship, unloaded ten 220-lb bombs in the vicinity of Harwich Force. The British took up this challenge the next day by sending six flying-boats into the Terschelling area.* The F2As caught sight of L 64 through the rain at 0819 hrs and 'chased ... for 24 mins. when it gained height of 5000 feet above us and then turned towards its own territory.'²⁵

This brush was prelude to a more novel and successful attempt to meet the challenge of the zeppelins. Experiments had been going on for some time in the use of flying-boat lighters to fly off fighter aircraft. On 30 May C.R. Samson, now commanding No 4 Group, RAF, had nearly drowned while testing a Camel fitted with skids that ran in wooden troughs on the lighter. On the advice of a young pilot on his staff with recent deck landing experience, Lieutenant S.D. Culley of Montreal, Samson decided that an ordinary wheeled fighter should be used for the next trial. On 31 July, as the destroyer *Redoubt* towed the lighter at 36 knots, Culley ordered the release of his Camel and became airborne almost at once.

The new technique was put to use on 10 August, when Rear-Admiral Tyrwhitt brought the entire Harwich Force, comprising four cruisers and thirteen destroyers, into the contested zone. The cruisers were carrying six coastal motor boats (CMBS) between them, while *Redoubt* and other destroyers were towing lighters carrying Culley's fighter and three flying-boats. Soon after 0600 hrs on 11 August the force hove to off Terschelling. The cruisers lowered the CMBS and in line ahead they raced away towards the mouth of the Ems in search of German surface craft. Though surface conditions prevented the F2As from taking off, three Yarmouth flying-boats under Leckie arrived at 0710 hrs. Leckie's formation spotted L 53 cruising westward at 15,000 feet, and so reported to the flagship.

To draw the airship westward, Harwich Force came round 180 degrees, making a heavy smoke screen. At 0841 hrs Culley took off from *Redoubt*'s lighter after a five-foot run. By about 0930 hrs he had reached 18,000 feet and found L 53 coming right at him on a reciprocal course slightly above him.

Very soon the huge bulk of the Zeppelin loomed ahead of me. I could see the control car and the engine gondolas with their propellers turning ... and as she passed over me I pulled the little Camel back into what was almost a stalled position, and pressed the trigger ... One

* Three Canadians were on this special patrol: Captain Gordon in the lead F2A, No 4284, with Second Lieutenant J.A.Y. LaForest of Hull, Que., acting as gunner and Second Lieutenant C.W. Gracey of Weston, Ont., second pilot in No 4300.

gun fired its complete pan without a break, but the other one jammed after firing only about half a dozen rounds.

... when my guns ceased firing, the Camel fell into a stall and dropped some 2000 feet, completely out of control. This gave me no chance to watch the airship until after I had got back on an even keel ... suddenly, at three widely separated points, bursts of pure flames shot out from the envelope; and within a minute the whole airship except the tail section was a mass of flames ... The burnt-out frame, still with a flag flying from the tail section, then dropped in one piece ... The time was 9:41, exactly an hour after I had taken off from the lighter.²⁶

Harwich Force had a grandstand view of the great fire, explosion, and falling debris that marked the end of L 53. Wary of German seaplanes, Culley flew on to the Dutch coast before making a rendezvous with the force at Terschelling Bank. When he came down near *Redoubt* at 1124 hrs he had a pint of fuel left. The sailors paid their personal tribute when Tyrwhitt in *Curacoa* led the entire force in line ahead, cheering ships' companies lining the rails, past Culley standing alone on *Redoubt*'s after-gun platform.²⁷

The force then turned to search for the overdue CMBS, rejoined by Leckie's Yarmouth patrol. In fact, however, the CMB flotilla had ceased to exist several hours before, all the boats having been sunk or run ashore by the scouring of Brandenburg monoplanes from Borkum. It was the first example of what can happen when warships are caught without cover by overwhelming air forces, and it had been predicted at the planning stage of the operation by pilots at Felixstowe and Yarmouth, who argued for Camel cover.²⁸

This was the last major operation in the Eight. Experience had demonstrated that the Grand Fleet was well in advance of the High Seas Fleet in heavier-than-air resources and in operating techniques. British reconnaissance aircraft had denied the German navy complete freedom in the waters adjacent to its home ports and had played a useful part in this aspect of the anti-submarine campaign.

The Dover Patrol's part in the anti-submarine campaign was to seal off the southern exit from the North Sea and harass the Flanders submarine and destroyer flotillas and their bases. It remained, in addition, the left flank of the Western Front and the defender of the lines of communication across the Straits. To carry out these tasks Vice-Admiral Keyes had more than three hundred ships, but was much under strength in air power. His air force, now No 5 Group under command of Lieutenant-Colonel F.C. Halahan at Dover, was reduced to a single wing, No 61, at Dunkirk. No 202 (reconnaissance) Squadron and 217 (anti-submarine) Squadron both flew DH4s, and there were three Camel squadrons, 201, 210, and 213.* The navy had relinquished control of its former bombing squadrons on the promise of RAF tactical support; they and other units of the former RNAS organization became 64 and 65 Wings and remained in the area as VII Brigade RAF, commanded by Lambe, now a brigadier-general. With the German spring offen-

* Under the RAF system former naval wings had 60 added to their previous designation. Thus 1 Wing RNAS became 61 Wing RAF. Squadrons were renumbered from 200 upwards. Thus 1 Squadron RNAS became 201 RAF.



sive, many of Lambe's squadrons, along with Nos. 201 and 210, went to assist in stemming the enemy advance further south.²⁹ Thus on the day the RAF came into being, there were only eleven Canadian airmen left under naval command.*

The first major operation mounted by the Dover Patrol after the creation of the RAF was the Zeebrugge-Ostend raid. British strengthening of the mine defences had been so successful that after February none of the larger U-type submarines attempted passage of the Strait of Dover. The smaller UB and UC boats of the Flanders flotillas, however, were able to slip past despite some losses, and thence to account for a high proportion[†] of merchantmen sunk. Keyes was therefore given a free hand by the Admiralty to deal with this problem in his own way.

His plan called for the sinking of ships loaded with cement at the entrances to Zeebrugge and Ostend, thereby closing the canals running to Bruges and making it impossible for U-boats and destroyers to use the two ports. The air arm was to divert the attention of the German gun and searchlight crews by bombing the batteries around Zeebrugge and Ostend beginning two-and-a-half hours before the

* They were J.F. Chisholm of Westmount, Que. (POW 26 Sept. 1918), J.W. Kennedy of Montreal and B.S. Wemp (Officer Commanding) of Toronto in 202 Squadron; P.E. Beasley of Victoria, BC, J.E. Green of Winnipeg (KIA 14 Oct. 1918), and G.C. Mackay of Toronto in 213; R.M. Berthe of Montreal, H.H. Gonyon of Wallaceburg, Ont., and C.E.S. Lusk of Toronto in 217; G.E. Hervey of Calgary in Dover Aeroplanes; A.C. Reid of Winnipeg in Dover Seaplanes.

† The figures for tonnage sunk per submarine per day at sea between January and September 1918 indicate that the Flanders boats surpassed those of the High Seas Fleet, averaging 258 tons per day as against 192 tons for the HSF boats. Marder, *Dreadnought to Scapa Flow*, v, 46n

naval zero hour. At that point they were to switch to incendiary bombing and the dropping of parachute flares to light up the assault areas. Detailed plans and training models of the area and its approaches had already been prepared as a result of a complete photographic survey carried out by 202 Squadron.³⁰

The first attempt, on 11 April, was called off because a sudden change in the wind direction to offshore made it impossible to lay a smoke screen to conceal the approaching ships. Handley Pages of VII Brigade, despite rain and poor visibility, had already been carrying out their part: 'We could clearly see the searchlights turned upwards ... the "flaming onions" soaring skywards ... hear the booming of the enemy's anti-aircraft guns and our bombs exploding.' One bomber crashed off Ostend, the crew all being rescued by a CMB except for the veteran Canadian pilot, Captain J.R. Allan, of whom there was no trace.³¹

The Germans now knew what was afoot. Nevertheless, Keyes persuaded the Admiralty to allow him to try again. In the interval, his air support had been much depleted.* In bright moonlight the naval armada set out again for Zeebrugge and Ostend on the evening of 22 April. Half way across rain began falling and visibility dropped to a mile. The Dunkirk bomber force was grounded and the attackers, in a 'forlorn hope' that brought them four VCs, scrambled on to the Zeebrugge Mole without the benefit of a distracting aerial bombardment. When they withdrew, they had sunk blockships off the entrance and had blown a gap in the railway viaduct linking the Mole to shore, at a cost of more than two hundred killed and four hundred wounded. The raid on Ostend, however, had been a complete failure, thanks to the wind veering and blowing the concealing smoke back on the ships.

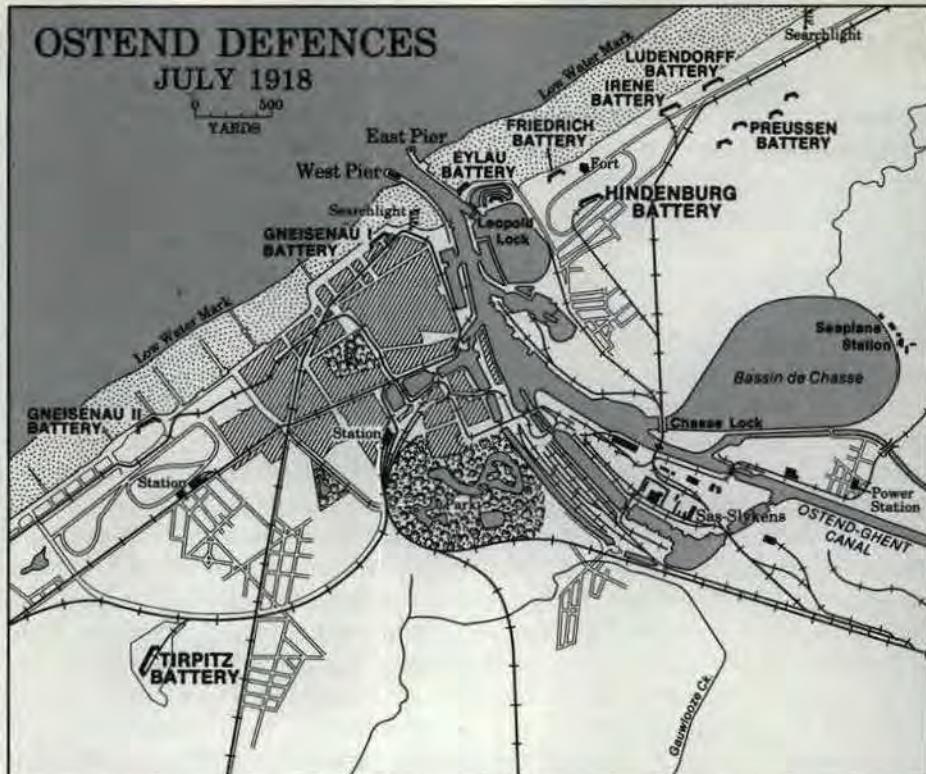
When the DH4s of 202 Squadron were making their first reconnaissance over the damaged Mole on 23 April, the Admiralty had already discovered that the canal had not been blocked from an intercepted German signal. After his first dismay at seeing the blockships lying athwart the narrow harbour mouth, Admiral L. von Schröder, the German flag officer at Bruges, quickly found that he could pass his smaller torpedo boats by them. Only the larger destroyers and U-boats had to use Ostend temporarily. By 14 May dredgers restored complete freedom of movement in and out of Zeebrugge.³²

Strategically the raid had been a failure. Psychologically, in those black days of April, its offensive daring greatly heartened the allied forces and civilian populations. Keyes, however, tried to keep up the pressure by a sustained aerial offensive against the large group of submarines and destroyers lying in the basin at Bruges. When he had taken over from Bacon he had lifted his predecessor's restrictions on bombing; he gave Lambe 'full liberty to attack the many military objects within

* On 13 April, in the face of German advances on the line of the Lys, Trenchard approved Salmond's evacuation plans for the Dunkirk area. Two bomber squadrons, 207 and 215, left for England at once, though the rest of the plans never went into effect. In return, Keyes got back a Camel Squadron, 204, on 18 April. With it came seven Canadians with RNAS experience: B.E. Barnum of Kingston, Ont., A.C. Burt of Brantford, Ont., G.S. Harrower of Montreal, C.R.R. Hickey of Parksville, B.C., R. McN. Keirstead of Toronto, W.F. Robinson of Davidson, Sask., and A.M. Shook of Red Deer, Alta; and a newcomer, W.J.P. Jenner of Blenheim, Ont. Trenchard to Salmond, 13 April 1918, CGS Army to RAF, 18 April 1918, Air 1/913/204/5/852

OSTEND DEFENCES

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reach, by day and night ... and assured him that the more offensive he was the better I would be pleased.³³

But the navy no longer controlled the bombers. VII Brigade had dwindled to one night-bombing and two day-bombing squadrons, with two fighter squadrons under training. Moreover, General Lambe had been ordered by the Chief of the Air Staff to cease dealing directly with the navy's No 5 Group as of 1 May: 'Any local arrangements that have to be made with this Group, will be made between the G.O.C., R.A.F., in the Field, and the O.C. No. 5 Group.' Lambe was incensed beyond measure, and his prime service loyalty asserted itself. 'If the anti-submarine campaign is to be continued,' he wrote Keyes, 'Bombing Squadrons must be placed under the direct command of the Vice Admiral, Dover.'³⁴ In a private letter he went further:

I have received orders to evacuate all the stores in the Dunkerque area, and that arrangements will be made for the supply of the Naval Squadrons through the Army. This is most unsatisfactory and is the thin edge of the wedge to take over the complete control.

In my own private opinion, the present R.A.F. – which was previously the R.F.C. – have more than enough to do to run their own show without interfering with the Navy, and at present they have so complicated affairs that the whole is absolute confusion.³⁵

Keyes immediately protested to the Admiralty. The weakness of the new Air Ministry was demonstrated when it yielded to almost all of Keyes' demands. Lambe was given command of all Dover Patrol air units. R.H. Mulock, now a

lieutenant-colonel on the Dunkirk headquarters' staff, was given the job of phasing out VII Brigade. No 65 Wing was to come directly under RAF HQ in France; all other units were to be attached to No 5 Group, which Lambe took over officially on 16 May. The navy's demand for additional bombing squadrons was met by the Air Council only in part, 'in view of the extreme urgency of demands ... elsewhere.' No 218 Squadron of DH9s, then forming at Dover, was allocated to No 5 Group, and 214 Squadron was made available on a temporary basis. Instead of meeting Keyes' request to return 201 and 210 fighter squadrons to naval control, the Air Ministry agreed instead to strengthen the six flights of 204* and 213 by two pilots and two Camels each.³⁶

The navy was still dissatisfied. After a second expedition to block Ostend on 9 May had proved no more successful than the first, the Admiralty once more demanded additional bombers, pointing out to the Air Ministry that 'it is of the greatest importance that this opportunity of destroying enemy craft in their harbours should be taken every advantage of.' No less a personage than Foch backed them up. Hearing of congestion in the Flemish ports from French naval air authorities, he asked Haig to concentrate bombing squadrons to 'conclude the work so happily begun by the British Navy.' Haig concurred, and Salmond thereupon transferred 98 Squadron of DH9s to No 5 Group, while the Air Ministry sent over 38 Squadron, a home defence unit of FE2bs. Keyes again protested. FE2bs were poor substitutes for heavy bombers, he pointed out. The Handley Page squadron, 214, had only been made available on a temporary basis, and he did not have full control over it. Finally, Haig's GHQ met the Admiral half way and on 4 June agreed to give him 214 Squadron for a month (it was, in fact, to remain under naval control until October); in exchange No 98[†] was returned to the GOC RAF on 6 June.³⁷

During May, while controversy continued over its strength, the Dunkirk air force dropped nearly seventy tons of bombs on the Bruges and Zeebrugge targets. No 98 Squadron, during its brief stay from 27 May to 3 June, made eleven daylight raids on Ostend and Bruges.[‡] On 28 May Captain C.H. Darley of Montreal, an

* One of the twelve extra pilots was Second Lieutenant W.B. Craig of Smiths Falls, Ont., who joined 204 Squadron.

† Prior to the departure of 98 Squadron, there were fifty-one Canadians serving in the Dover/Dunkirk Command. No 38 included L.M. Goodfellow, address unknown, D. Humphrey of Montreal, W. Marginson of Winnipeg, and W.W. Waterson, address unknown. In 98 were G.D. Dardis of Morrisburg, Ont., R. McK. Hall of Ingersoll, Ont. (KIA 28 May 1918), G.D. Horton, address unknown (KIA 31 May 1918), F.A. Laughlin of Thorold, Ont., E.R. Macdonald of Matheson, Ont. (POW 9 Aug. 1918), N.C. Macdonald of Bluevale, Ont., F.F.H. Reilly of Welland, Ont. (KIA 28 May 1918), C.D. Taylor of Edmonton. With 214 were J.R. Belton of Ottawa, C.H. Darley of Montreal, C.G. Lee of Winnipeg, H.A. McCormick of Pembroke, Ont., E.F. McIlraith of Lanark, Ont., J.M. Nichol of Vancouver, and J.D. Vance of Toronto. No 218 included A.M. Anderson of Toronto, M.G. Baskerville of Dominion City, Man., J.F. Chisholm of Westmount, Que. (POW 26 Sept. 1918), W.F. Cleghorn of Toronto (KIA 2 Oct. 1918), J.W. Kennedy of Montreal, W.F. Purvis of Toronto, R.W. Robinson of Komoka, Ont. (KIA 10 June 1918), B.H. Stata of Morrisburg, Ont. (KIA 28 Sept. 1918), and B.S. Wemp of Toronto.

‡ Four DH9s were lost during these raids, and among the aircrew casualties were the Canadians R. McK. Hall (KIA 28 May 1918), G.D. Horton (KIA 31 May 1918), and F.F.H. Reilly (KIA 28 May 1918). GOC No 5 Group to GOC RAF in the Field, 6 June 1918, Air 1/913/204/5/852

experienced Handley Page pilot, was chosen to carry out the destruction of the lock gates at the northern end of the Bruges-Zeebrugge Canal at low water. Had the plan succeeded all vessels would have been stranded in the system. Darley glided in from seaward at 200 feet, and released three 520-lb bombs, two of which fell in the water, while the third detonated close to the northern gate. Neither this attack, nor another a few minutes later by a DH4 (shot down by anti-aircraft fire), was successful.³⁸

The offensive strategy Keyes and Lambe were able to push with their augmented air strength soon brought a powerful German response. On the nights of 4, 5, and 6 June the Gotha wings in Flanders made a series of strikes against the RAF aerodromes at Bergues, Coudekerque, Petite Synthe, Capelle, and Tetegehem. Hangars were wrecked and forty-two aircraft were rendered unserviceable. Coudekerque had to be abandoned except as a landing ground and the Handley Pages of No 214 moved to St Inglevert, southeast of Calais.³⁹

To combat British bombing, the Germans also revised their fighter organization. The commander of the marine air forces at Bruges had three squadrons, with the main base at Varsseveld. In the spring of 1918 these squadrons were combined with two others to form a naval fighter wing (*Marine Jagdgeschwader*), commanded by *Oberleutnant zur See* G. Sachsenberg. With the commencement of the British bomber offensive, Admiral Schröder ordered that control over the commitment of fighter squadrons against bomber attack was to be given directly to Sachsenberg, rather than remain at the corps level. The Germans could now react more quickly to attack, but when Sachsenberg discovered that RAF bombers stayed at high altitudes until his fighters used up their fuel, he decided to go over to the offensive. 'We attacked the opponent in his airports with successive waves of squadrons,' he later wrote, 'and ... moved above enemy territory at great heights, waiting for the returning ... formations and forcing them to fight.'⁴⁰ The *Jagdgeschwader*'s effectiveness was further enhanced with the first deliveries of the Fokker D-VII, an aircraft much superior in performance to the Fokker Triplane, Albatros, and Pfalz fighters it was then using.

With both sides now dedicated to an offensive policy, the stage was set for a struggle for aerial supremacy as relentless as that waged over the Western Front. On the night of 29–30 June Gotha bombers destroyed twelve Camels, damaged twenty-six other aircraft, and gutted two hangars at Bergues. Within hours there occurred the first of a series of large-scale air battles in the Flemish skies. No 204 Squadron, with fifteen Camels, was escorting No 218 on a raid against Zeebrugge when the British force was attacked by thirty German fighters. Similar odds were encountered by No 218 five days later on a raid against Bruges, when the Canadian pilots Cleghorn and Baskerville shot down two enemy fighters. At Keyes' urging the Admiralty, citing the 'large increase' of enemy aircraft on the coast, demanded the return of its lost fighter squadron. Haig yielded, and on 8 July 210 Squadron, a unit then almost 50 per cent Canadian in composition, was transferred back to naval control.* Despite stiffening German opposition, No 5 Group dropped 134

* No 210's Canadian pilots were E.H. Bullen of Petrolia, Ont. (POW 22 July 1918), H.J. Emery of Edmonton, E.N. Gregory of Lindsay, Ont., W.W. Gyles of Virden, Man., A. St G. Highstone of Sault Ste Marie, Ont., W.S. Jenkins of Montreal, G.A. Welsh of Sunderland, Ont., H.H. Whitlock of Charlottetown (POW 14 Oct. 1918), and G.B. Wootten of Andover, NB.

tons of bombs on naval targets in June* (Dunkirk's high point for the war); the total declined to 83 tons in July, with bad weather as much to blame as enemy fighters. These totals were supplemented by those recorded by 211 Squadron from the RAF's 65 Wing, and later by 108 Squadron of the same wing,† which made its first raid for the navy on 12 August.⁴¹

For the bombing campaign against naval targets to have any chance of success, ascendancy had to be gained over German fighter forces. On 13 August a major operation was launched against the main German base at Varssevare. Fifty Camels of 204, 210, and 213 Squadrons – and of 17th US Aero Squadron, attached to the RAF – headed up the coast and turned inland over Ostend at the leader's signal. Out of the dawn they swept in low over the airfield, shooting up everything in sight and dropping HE and incendiary bombs. No 211 Squadron rounded out the attack by bombing the aerodrome as the fighters sped away. On the ground there was chaos, the Germans having been caught with flights of Fokkers lined up for take-off: 'Like startled birds airmen and mechanics were rushing out of their lodgings, only to have to throw themselves immediately flat on the ground while British fighters flying a mere 5–10 metres above ground were spraying them with machine-gun fire ... we lost more than a dozen aircraft and had to see our *Schloss* and a number of hangars going up in flames.' Yet, though Varssevare took some time to recover from this onslaught, German resistance in the air was not perceptibly diminished. On 15 August a patrol of 204 Squadron engaged thirteen Fokker and Pfalz fighters east of Ypres and claimed four shot down, two of them credited to Lieutenant W.B. Craig of Smiths Falls, Ont. On the evening of the same day another patrol from 204 fought a fifteen-minute engagement with a large enemy formation; Captain C.R.R. Hickey of Parksville, BC, sent one down in flames and

* Since June No 5 Group's night bombers had been under the command of Lt-Col R.H. Mulock, the senior Canadian pilot at Dunkirk. Nos 38, 214, and 218 Squadrons had been formed into 82 Wing, based at Capelle. Shortly after the wing had been organized the Air Ministry requested Mulock's services for another appointment, but were put off when Keyes stated that 'it would be disastrous to move him at this period.' Mulock finally relinquished command of 82 Wing and ended his long association with Dunkirk on 28 July, when he left to take command of No 27 Group. Keyes to Admiralty, 9 June 1918, Air 1/77/15/9/186; Scarlett memorandum, 18 June 1918, Air 1/308/15/226/193; No 5 Group, fortnightly summary, 16–31 July 1918, Air 1/39/AH/15/9/2. Canadians joining 82 Wing after its formation in June included B.L. De Salaberry, address unknown, in 38 Squadron; and W.F. Bates of Aylmer, Que., H.P. Brumell of Buckingham, Que. (POW 28 Sept. 1918), G. Carmichael, address unknown, M.J. Carroll of Toronto, J.A. Eyres of Eyremore, Alta, F.J. Gallant of Rogersville, NB, H.R. Murray of Toronto, S.W. Orr of Hamilton, N.M. Scott of Ottawa, and T.M. Steele of Stratford, Ont. (WIA and POW 28 Sept. 1918) in 218 Squadron.

† Between April and September 1918 thirteen Canadians served in 211 Squadron. They were H. Axford of Winnipeg, P.E. Beasley of Victoria, BC, C.O. Carson of Morrisburg, Ont., L.K. Davidson, address unknown (POW 8 Aug. 1918), C.H. Dickens of Edmonton, J.S. Forgie and H.M. Ireland, both of Toronto, J.H. McLellan of Vancouver, J. Munro, address unknown, H.H. Palmer of Richmond Hill, Ont., V.G.H. Phillips of Shelburne, Ont., G.T. Scott, address unknown, and A.G. White of Victoria, BC (KIA 29 Sept. 1918). During the period that 108 Squadron flew bombing raids for the navy, H.D. Buchanan of Lévis, Que., C.P. Crites of Simcoe, Ont. (POW 4 Sept. 1918), G.R. Harrison of Dartmouth, NS, A.M. Matheson of Meadowville, NS (POW 1 Oct. 1918), J.J. McDonald of Sydney, NS (POW 15 Sept. 1918), H.L. McLellan of Tatamagouche, NS (KIA 21 Sept. 1918), G.C. Page of Calgary, and D.A. Shanks of Hawick, Que., were with the squadron.

shared in the destruction of a second. Again, on 21 August 210 Squadron had a brush with enemy fighters during which Second Lieutenant W.S. Jenkins of Montreal shot down an Albatros; the enemy scout crashed near a kite balloon west of Warneton.⁴²

Ultimately the fighter struggle in this sector became a thing in itself. Thus, while the bombing of naval targets from Dunkirk began to taper off in September, the tempo of air fighting actually increased. In air actions during the closing weeks of the war for which there is sound evidence that enemy fighters were destroyed, Canadian pilots in 204, 210, and 213 Squadrons took a part at least commensurate with their numbers. On 5 September Greene and Mackay of 213 both shot down Fokkers that crashed close to one another; the same day Mackay shared with another pilot the destruction of a Rumpler that was 'seen to crash.' On 16 September nineteen Camels from 204 duelled with fourteen Fokkers, four seaplanes, and three LVGs between Ostend and Blankenberghe. Hickey and Craig each shot down a Fokker in flames, while G.E.C. Howard of Toronto saw his LVG opponent hurtle into the sea (he himself was shot down and taken prisoner on 26 September). No 204* seems to have been in almost constant action during these days. On 20 September F.R. Brown of Winnipeg and H.G. Clappison of Hamilton, Ont., both destroyed Fokkers; Craig won another victory on 24 September (he was killed over Dunkirk two days later) and Hickey added another on the 25th.⁴³ For 210 Squadron, W.S. Jenkins had shot down two Fokker biplanes on 17 September south of Ostend, one of which crashed by the canal bank, and another on 24 September following a raid upon Ghastelles aerodrome.[†]

Alongside the bombing campaign, and the spectacular outburst of fighter activity that outlasted it, the daily work of other units of No 5 Group continued unabated. Thus 202 Squadron[‡] ranged constantly over its sector of the Flemish coast to provide photographic intelligence for the bomber force and to spot for naval siege guns and the monitors. The Camels of 213 Squadron were responsible

* No 204 Squadron was about half Canadian in the period July–October 1918. Its pilots included H.A. Argles of Toronto, S.C.J. Askin of Windsor, Ont. (POW 12 Aug. 1918), B.E. Barnum of Kingston, Ont., W.E. Baxter of Vancouver, L.S. Breadner of Ottawa, F.R. Brown of Winnipeg, A.C. Burt of Brantford, Ont., H.G. Clappison of Hamilton, Ont., W.B. Craig of Smiths Falls, Ont. (KIA 26 Sept. 1918), H.W.M. Cumming of Toronto, A.C. Evans of Windsor, Ont., C.R.R. Hickey of Parksville, BC, G.E.C. Howard of Toronto (WIA 3 Sept. 1917, POW 26 Sept. 1918), W.J.P. Jenner of Blenheim, Ont., R.M. Keirstead of Toronto, P.A.H. King of Victoria, BC, H.G. Murray (KIA 27 Oct. 1918), and R.C. Pattullo (KIA 15 Sept. 1918), both of Toronto, W.A. Pomeroy of Esquimalt, BC, J.R. Robertson of Blenheim, Ont., W.F. Robinson of Davidson, Sask., E.G. Rolph of Toronto (POW 20 Sept. 1918), A.J.F. Ross of Calgary, W.G. Sibary of Renfrew, Ont., and L.P. Worthington of Westerdale, Alta.

† Canadians in 210 in the period Aug.–Oct. 1918 were A.G. Baker of Toronto, E.M. Faris of Bradford, Ont., E.N. Gregory of Lindsay, Ont., W.W. Gyles of Virden, Man., A. St G. Highstone of Sault Ste Marie, Ont., R.W. Hopper of Toronto (POW 8 Oct. 1918), W.S. Jenkins of Montreal, D.D. McQuat of Brownsburg, Que., J.E. Pugh of Stony Plain, Alta, G.A. Welsh of Sunderland, Ont., and H.H. Witlock of Charlottetown, PEI.

‡ New arrivals at 202 in June 1918 were C.R. Moore of Toronto (POW 28 Sept. 1918) and A.M. Stephens of Moose Jaw, Sask. Another was J. Robinson of Toronto, an RNAS veteran of the East African campaign in 1916 and later special pilot to the King of the Belgians who had served with No 2 (N) from May to November 1917 until wounded.

for seaward fleet defence, while the DH4s of 217 Squadron complemented the land bombing by frequent attacks upon the submarines and surface vessels operating out of Ostend and Zeebrugge.* This squadron began to encounter the fine monoplane fighter, the Brandenburg w 29, in July. On 29 July Lieutenant A. McM. Phillips of Toronto and another DH4 pilot were given joint credit for shooting down a Brandenburg, which 'was completely destroyed on impact with the water.'† Phillips, who shot down two other aircraft during his time with the squadron, was responsible for half the total claimed by the unit. In addition to the work of all these squadrons, the seaplanes and aeroplanes at Dover‡ continued their duties of anti-submarine patrols and the escort of coastal convoys.⁴⁴

As the allied armies moved forward to the last great assault upon the German lines, No 5 Group was switched, on 28 September, to support of the Belgian army in the Flanders offensive. On 17 October a pilot of 210 Squadron touched down in Ostend's market place, while Keyes, offshore in *Termagant*, watched the pilots of 202, 204, and 210 'looping the loop' over the town. By 20 October the left flank of the allied front ran to the Dutch border. The day before the Armistice three Canadians, Lieutenant G.C. Mackay and Second Lieutenants A.B. Rosevear and H.H. Gilbert, shared with another pilot of 213 Squadron in destroying the group's last victim, an LVG two-seater that crashed after a low-level dogfight over Ghent.⁴⁵

From the creation of the RAF in April 1918 113 Canadians had flown out of Dunkirk and another eight from Dover. Forty-four of them had become casualties, 16 per cent of the total at Dunkirk.[§] Of the 169 German aircraft claimed by No 5 Group, Canadians were credited with thirty-eight and shared ten more with other pilots. The most successful fighter pilot in the group was C.R.R. Hickey, who apparently shot down eight aircraft and shared in the destruction of two more before his death in a mid-air collision on 3 October. J.E. Greene of No 213 was

* New Canadian members of 217 during 1918 were W.F. Anderson of Toronto, K.G. Boyd of Amberley, Ont., D.W. Davies of Victoria, BC, A.W. Farquhar of Toronto, C.J. Moir of Killarney, Man. (KIA 30 June 1918), C. St C. Parsons (POW 22 April 1918), and A. McM. Phillips, both of Toronto, and H.S. Stidson of Winnipeg.

† RAF reports claim that two monoplanes were destroyed in the action, but the war diary of *Seeflugstation Flanders I* shows only one aircraft lost. See No 5 Group fortnightly summaries, 16-31 July 1918, Air 1/39/AH/15/9/6; 'The Hornets of Zeebrugge,' *Cross & Cockade Journal*, xi, spring 1970, 27.

‡ From July 1918 there were two flights of aeroplanes and one of seaplanes under Halahan at Dover. The aeroplane flights were used by Lambe to rest pilots from front line duties; the first two Canadians to benefit were Lieutenants J.E. Greene and G.C. Mackay. Captain A.C. Reid flew seaplanes out of Dover until the end of the war; before the Dover organization was formed into 233 Squadron in October he was joined by Captain H.H. Gonyon and Second Lieutenant R.M. Mulvihill of Arnprior, Ont.

§ Dunkirk returns show that many of the casualties occurred after the arrival of the Fokker D.VII, and that DH9 crews were especially vulnerable. Pilot wastage from accidents, however, was 'most appalling' in Lambe's view. Though new pilots were arriving with double the hours of their predecessors in 1917, and were given intensive advanced training in the pilots' pool at Adembert, established in May under the command of the much-decorated Canadian fighter pilot, Captain A.M. Shook, Lambe considered that there was still poor aerodrome discipline and that young pilots were taking too many careless and unnecessary risks. Lambe to OC's 61 and 82 Wings, 23 Aug. 1918, Air 1/73/15/9/150; Lambe to Halahan, 30 May 1918, Air 1/57/15/9/55

credited with five victories and two shared before he was killed in the Belgian offensive, while in No 210 W.S. Jenkins was the leading Canadian, being credited with five aircraft shot down.⁴⁶

The work of these Canadians and their fellow flyers had been shaped by the offensive strategy of Keyes and Lambe, centred upon the bombing of the Bruges basin. The bombing attack had been far more concentrated than previous Dunkirk bombing campaigns; a third of the 510-ton total dropped during the six-month period was directed at the area of the Bruges docks. The total effect of the bombing upon German naval bases and ships is difficult to establish, partly because, when they departed, the Germans carried out extensive demolition of key installations. It is known that Handley Pages from 214 Squadron put UB 59 out of the war with a hit on 16 May, and that in the same month aircraft sank the destroyer V74 at Zeebrugge. Four other derelict destroyers, V47, V67, V77, and S61, which were blown up at the time of the German evacuation, may also have received their original damage from air attacks.* Nevertheless, the RAF committee of investigation which assessed the bombing after the Armistice concluded that 'the results ... were not decisive either in the whole area or in any single part of it'.⁴⁷

Part of the explanation for the relative failure of the bombing campaign was technological. Inaccurate bomb-sights and unreliable bomb-release gear were important factors. Many of the bombs dropped were far too light for effective use against heavy installations, especially those reinforced with ferro-concrete. The SN 1660-lb bombs had the needed penetrating power, but for the Handley Pages to carry them the weather conditions had to be ideal. From August onwards only one Handley Page was kept armed with this bomb and ready, weather permitting, to attack the Bruges docks. In giving that order, Lambe noted that none of the SNS released to that date had fallen 'within miles of their objectives'.⁴⁸

It might also be argued that neither the Air Ministry nor the army had been sufficiently generous in allotting the Dover Patrol the numbers of heavy night bombers it needed, failing to recognize the vital importance of striking at German-held ports. This is another way of saying that bombers might more usefully have been allocated to the navy than turned over to the Independent Force for its offensive against Germany. But given the purposes which led to the creation of the RAF, the composition of the Air Ministry, and the political and public pressures working upon it, it would seem more realistic to conclude that the Admiralty did well to extract from the ministry and the army any squadrons at all. Though the importance of destroying the target gave Keyes and Lambe a good case, their demands, at least in part, constituted an attempt to challenge the consequences of the formation of a third service. Unquestionably, however, the Air Ministry in its

* For example, on 10 August a DH4 of 217 Squadron, in which the Canadian pilot A. McM. Phillips was flying as observer, damaged the stern of a destroyer with a bomb hit that produced 'a very big explosion accompanied by dense clouds of smoke.' No 5 Group fortnightly summary, 1-15 Aug. 1918, Air 1/39/AH/15/9/6

† The first 1660-lb bomb was dropped on the night of 24-25 July. The shaken inhabitants of Middelkerke immediately doused all lights and the anti-aircraft guns in the vicinity fell silent. Later photographs showed that the bomb had made a huge crater in a field half-a-mile out of town.

disposition of available bombers was unduly affected by political considerations, including inter-service politics. Both the nature of its origins and production shortages meant that the RAF lacked the flexibility that air mobility was supposed to permit and therefore was unable to concentrate a bomber force in Flanders at a time when it might have accomplished something. It should not be overlooked, however, that of the total tonnage dropped upon German naval targets during this period, more than a quarter was contributed by the RAF's 65 Wing.

The Dover Patrol's prime function was to shut off the Strait of Dover to the U-boats. In this task it was largely successful. After May 1918 few submarines risked the hazards of the air-sea patrol and the deep minefields; the last to try got through on 14 August. Of the forty-four boats in the Flanders Flotillas in 1918, thirty-three were sunk or interned, three were rendered unserviceable through damage, and one was retired from service. At the time, aeroplanes were credited with destroying two submarines, and on both occasions Canadian pilots took a leading part. On 3 April Captain H.H. Gonyon of Chatham, Ont., made the first of several promising bombing runs on a U-boat seen to dive off Dunkirk. On 12 August Captain K.G. Boyd of Toronto appeared to score a hit on the conning tower of a submarine steering towards Ostend. He reported that it 'rolled slowly over to starboard and lay bottom up for five minutes sinking slowly.'⁴⁹ Despite such persuasive detail, German records show that no submarines were lost in the area on either date.

The naval task in the Mediterranean in 1918 was the protection of maritime routes against surface and underwater attack, in support of the Italian, Macedonian, and Palestinian military theatres. Most of the fleet had to be deployed on various anti-submarine duties to counteract the Austro-German flotillas based in the Adriatic. Capital ships were still required to counter the Austrian Fleet as well as *Goeben* at Constantinople. It had been decided at the allied Naval Council meeting in Rome on 8-9 February that the principal thrust of the year would be an offensive in the Strait of Otranto and against U-boat bases, rather than in the strengthening of the convoy organization. Air tasks to meet naval priorities were carried out by the Adriatic, Aegean, Egypt, Gibraltar, and Malta Groups, each under the orders of the local senior naval officer.⁵⁰

Air support for the Otranto Barrage was provided by the Adriatic Group* under command of General Longmore, with headquarters at Taranto. For airmen the

* Canadians with the Adriatic Group, all members of the former RNAS organization in the area, were A.R. Layard of Saanich, BC, a technical officer, A.L. Huether of Guelph, Ont., H.G. Raney of Ottawa, and E.C.R. Stoneman and F. Wood, both of Toronto. E.C. Bredin, address unknown, was on Kite-Balloon operations out of Brindisi. By the late summer a number of other Canadians had joined the group, including two technical officers, A.P. Beal of Lindsay, Ont., and F.W. Mansell of Lethbridge, Alta; two observers, C.K. Chase, address unknown, and J.P. Corkery of Almonte, Ont. (killed in a raid on Cattaro on 23 Aug. 1918); three seaplane pilots, W.R.S. Henderson of London, Ont., G.K. Lucas of Markdale, Ont., and H.L. Nunn, address unknown; and seven aeroplane pilots, E.I. Bussell of Toronto, D.M.B. Galbraith of Carleton Place, Ont., M. Hellwell of Toronto, B.W. Hopkins of Hamilton, Ont., A.B. Shearer of Neepawa, Man., G.W. Stubbs of Victoria, BC, and A.L. Taylor, address unknown. Later arrivals were two pilots, H.W. Pope of Moose Jaw, Sask., and J.T. Rose of Toronto, and three observers, J.A. Simmers and K.P. Kirkwood, both of Toronto, and G.E.S. McLeod of Saint John, NB.

daily patrolling of the barrage was extremely monotonous. It was relieved by periodic bombing raids against U-boat bases in the Adriatic. The raiding of bases in the upper Adriatic was an Italian responsibility; the RAF directed its attacks against Cattaro in Austria and Durazzo in Albania. The Austrian Naval Air Service, with less than a hundred aircraft available for war service, never offered significant opposition. The Adriatic Group itself was well below the planned complement both in personnel and aircraft, and so, at least until the end of July, its raids were on a small scale. In August it was possible to mount more ambitious attacks, though they were not without their hazards. The round trip to Cattaro was over four hundred miles, most of it over water; Captain A.B. Shearer of Neepawa, Man. (a future RCAF Air Vice-Marshal), came to grief on his first crossing of the Adriatic. Bucking headwinds, he took four-and-a-half hours to reach Cattaro and, with insufficient fuel to get back, had to cross enemy lines and land on the Italian-held beach at Valona in Albania.⁵¹

On two occasions the Adriatic Group provided support to army operations. Between 6 and 10 July aircraft from Otranto assisted the advance of the Italian XVI Corps up the Adriatic coast from Valona. On 2 October the group provided bombers, fighters, and reconnaissance aircraft for a naval attack upon Durazzo undertaken by Italian and British vessels. E.C.R. Stoneman of Toronto was one of the pilots in the first wave of bombers over the target at 0615 hours. As this wave landed at Andrano airfield a second formation, in which Captain C.K. Chase and Second Lieutenant G.W. Stubbs, of Victoria, BC, were flying as observers, took off, and carried out their bombing runs while the allied fleet was manoeuvring off Durazzo prior to its bombardment. Second Lieutenant B.W. Hopkins of Hamilton, Ont., flew a DH9 of the third wave that bombed during the naval bombardment itself, while Stoneman returned with the last formation of seven aircraft that hit the town at 1130 hrs, by which time the fleet had ceased firing and hauled off.⁵² As military operations drew to a close, aircraft of the group joined in the harrying of the Austrian army as it retreated on the Albanian front. By the end of October the German submarines had abandoned their bases, and the bombing of Cattaro and Durazzo ceased.

In its assessment of the bombing operations the Admiralty was enthusiastic, describing the attacks as being of 'the greatest possible value'; it considered that 'besides the damage probably caused to submarines themselves and certainly to their depots and shops, the moral effect must be considerable.' These opinions, as in so many other cases, appear to have little foundation in fact. There is no evidence that U-boats were either damaged or destroyed in harbour, and Durazzo by August had already become of little importance as a base.⁵³

The Eastern Mediterranean was the preserve of the Aegean Squadron, with headquarters at Mudros on the island of Lemnos. Its job was to blockade the Dardanelles and to combat U-boats operating in its sector. The Aegean Group's tasks, therefore, were to carry out reconnaissance of the Strait and the Sea of Marmara to alert the navy of enemy fleet movements, and to maintain routine anti-submarine patrols. In addition, the RAF was also responsible for giving air support to the army operations on the Salonika front, and for carrying out 'independent' bombing of Turkish rail communications, air bases, and Constantinople

itself. To carry out these commitments, the group had slightly more than its authorized establishment of seventy-two aeroplanes and twenty-four seaplanes. Two bomber and two fighter squadrons were allocated to 62 Wing, while all seaplanes were attached to 63 Wing. The force included adequate numbers of Camels and Short seaplanes, but there was also the usual collection of vintage aircraft such as BE2cs, Henri Farmans, and Sopwith Pups. These aircraft were distributed in small detachments at bases on the Greek mainland and the Aegean Islands.⁵⁴

At least twelve of the eighteen Canadians serving with the Aegean Group at the beginning of April were flying with 62 Wing.* At Stavros, on the mainland, Captain D.M. Ballantyne of Montreal and Lieutenant W.R. Glenny of Little Britain, Ont., were involved in military reconnaissance, offensive patrols, and the bombing of Drama aerodrome and other targets in the lower Struma River area. In May the group provided additional assistance on the Macedonian front when DH4s and Camels from Imbros co-operated with 17 and 47 Squadrons in attacks on Drama and the Ruppel Pass. Ordinarily the Imbros Camel pilots, who included Captain D.F. Murray of Victoria and Lieutenants A.S. Girling and F.M. McLellan of Springhill, NS, carried out the important daily reconnaissance of the Strait, the Gallipoli peninsula, and enemy airfields at Galata and Chanak. Camels went up in relays of two from 0300 hrs until 1100 hrs, when the intense heat of mid-day over the Dardanelles forced a break until the late afternoon. Longer-range reconnaissance flights over Constantinople to check on the battlecruiser *Goeben* were carried out by DH9s fitted with extra fuel tanks. Lieutenant T.H. Blair, flying out of Lemnos, took part in a successful flight of two DH9s which photographed the *Goeben* lying in Stenia Bay after two earlier attempts had ended in loss of aircraft.⁵⁵

Both the bombers from Imbros and seaplanes carried out frequent raids on the enemy airfield at Galata. On 24 August Lieutenant S.A. Grant of Montreal, flying a seaplane from Talikna, fired an 18-inch torpedo on the hangars 'with good results.' On another night-bombing attack on Galata, Grant and his observer, Lieutenant F.R. Bicknell of Dunnville, Ont., had their radiator punctured by machine-gun fire. The engine rapidly overheated as they limped back across the Gallipoli peninsula. 'We crashed in flames in the Gulf of Xeros,' Bicknell recalled, and 'remained afloat by hanging to the small tail float which we had managed to hack off with pocket knife before the plane sank about one hour after landing at mid-nite.' After twelve hours in the water they were picked up by the Greek destroyer *Leon*.^{†56}

* D.M. Ballantyne of Montreal, T.H. Blair of Toronto, H.J. Elliott of Edwards, Ont. (KIA 29 June 1918), A.S. Girling, address unknown, W.R. Glenny of Little Britain, Ont., F.M. McLellan of Springhill, NS, D.F. Murray of Victoria, BC, G.M. Scott of Westmount, Que. (KIA 13 June 1918), W.J. Sussan and H.A. Urquhart, both of Ottawa, A.Y. Wilks of Montreal, and H.J. Wiser of Prescott, Ont.

† In addition to Grant and Bicknell, there were C.A. Beattie of Ingersoll, Ont., and F.J. Mackie of Winnipeg at Talikna; and G.S. Abbott of Ottawa (WIA 30 Nov. 1916), R.E. Spear of Winnipeg, and F.P.L. Washington of Hamilton, Ont., at Suda Bay on Crete. Later reinforcements were W.H. August of Winnipeg, R.H. Cross and H.M. Keith, both of Toronto, R.G.K. Morrison of Chesterville, Ont., H.G. Thompson of Belmont, Ont., and G.K. Waterhouse, of Kingston, Ont. B.N. Harrop of Indian Head, Sask., flew seaplanes from *Vindex*.

The Air Ministry had plans for the Aegean Group that had nothing to do with anti-submarine operations. It wished to use the group to bomb Constantinople, and in June transferred two squadrons from the Middle East Brigade to the Aegean. When the transfer was held up, the group was left to carry out the job from its own resources, a policy the air adviser to the Commander-in-Chief Mediterranean thought ill-judged. 'This will be done but in a very spasmodic way with the present strength allowed,' wrote General A.V. Vyvyan, 'and I very much doubt if it is worth doing unless doing well.' Two flights of bombers, assembled at Romanos aerodrome on Lemnos, made a total of nine raids on the Turkish capital between July and September with no discernible effects. Yet the Air Ministry, still pursuing the will-o'-the-wisp of 'decision through strategic bombing,' continued to reinforce the Aegean Group until the close of hostilities. No 144 Squadron reached Mudros in mid-October, and No 226 was transferred to the Aegean from the Adriatic Group. Large drafts of pilots and observers were also sent in,* so that by November the group was well over establishment and had been reinforced more heavily than any of its Mediterranean counterparts. On 18 October twelve bombers struck at Constantinople for the last time. The airmen of the group do not appear to have attached any high degree of seriousness to that raid, or to the whole bombing enterprise against Turkey. As the lead aircraft, its engines throttled back, touched down at Lemnos after its five-hour flight, a visiting senior officer noted that its pilot, the officer commanding 226 Squadron, and his observer, the 'light hearted' Canadian C.K. Chase, were serenading the spectators with mouth organ and drum.⁵⁷

The other three groups in the Mediterranean could have used some of the reinforcements granted the Aegean. The Royal Navy and its supporting RAF units in the central and western Mediterranean had been denuded of strength to supply the Otranto Barrage organization in the spring, while playing a crucial role in the anti-submarine warfare for the whole theatre. The Malta, Gibraltar, and Egypt groups were all much under strength during 1918 and the number of Canadians serving in them was correspondingly small.[†] At Malta, Shorts and F3s were flown out of Kalafrana. The Malta seaplane station was supposed to have fifty officers; the aver-

* At least thirteen Canadians were among the reinforcements for 62 Wing. They were N.M. Craig of Fergus, Ont., H.E. Dobson of Toronto, H.F. Farncomb of Trenton, Ont., H.G. Fraser of Norwood, Ont., W.S. Haney of Sarnia, Ont., B.W. Hopkins and C.I. Lancefield, both of Hamilton, Ont., K.G. MacDonald of Victoria, BC, J.W. McArthur of Quebec City, V.J. O'Neill of Ottawa, F.M. Ramsay of Inglewood, Ont., A.H.K. Russell of Toronto, A.P. Stock of Peterborough, Ont., and J.S. Wood of Oakville, Man. With 144 Squadron were W.F. Willis of Winnipeg and S.E. Young, address unknown.

† Canadians at Kalafrana were B.N. Harrop of Indian Head, Sask., D.H. Hartness of Nanaimo, BC, K.P. Kirkwood of Toronto, C.W. Lott of Brussels, Ont. (kia July 1918), J.A. Munn of Hensall, Ont., and F.J. Vincent, address unknown, in *Riviera*; and L.E. Nicholson of Winnipeg in *Manxman*. Both these carriers were attached to Malta Group for a time. E.C. Potter of Winnipeg, in *Engadine*, is the only Canadian known to have served with Gibraltar Group. Three Canadians were with the Egypt Group: H.W. Eades of Nelson, BC, an observer, and two pilots, L.E. Best of Victoria, BC, and W.T. Ward of Vancouver. There were four Canadian KB officers at Malta: T.D. Fitzgerald of Hamilton, Ont., G.O. Lightbourn of Toronto, R.W.R. Waage-Mott of Victoria, BC, and A.H. Walker of Toronto; while Alexander Ross of Toronto served in a similar capacity at Gibraltar.

age through the year was about twenty. Gibraltar never got its planned squadron of F3s; seaplane patrols there were provided first from *Empress* and later from *Engadine*. The Egypt Group (administered by RAF Middle East Brigade but under naval authority for operations) worked from Port Said and Alexandria; it too was short of personnel. In addition to these units the RAF also created a network of kite balloon stations under the groups to protect Mediterranean convoys.⁵⁸

As an increasing proportion of Mediterranean shipping came to be in organized convoys or under escort for part of a journey, seaplane patrols began to be superseded by air escort work. Convoy escort provided the best form of protection for merchant shipping, and the best opportunities for attacking submarines. Figures for aircraft in the Egypt Group illustrate the general trend:

EGYPT GROUP PATROLS, APRIL-OCTOBER 1918

MONTH	S/M & OTHER	CONVOY	
	PATROLS	PATROLS	TOTAL
April	24	61	85
May	40	52	92
June	14	54	68
July	18	93	111
August	15	107	122
September	15	111	126
October	28	101	129
	154	579	733

From the increasing emphasis given to convoy patrol it would appear that the offensive potential of the convoy system had been recognized in the Mediterranean. Unfortunately, there was a general shortage of airmen and aircraft in the Mediterranean anti-submarine groups. The pilots in the Egypt Group flew more hours a day, on the average, than the pilots in any other RAF command engaging in anti-submarine work. The average number of pilots available for patrols never exceeded thirteen for any month and the average number of serviceable seaplanes at Alexandria and Port Said combined was never more than twelve.⁵⁹

The Mediterranean convoy system was a dramatic success, although at the time the naval command credited the victory over submarines to the Otranto Barrage.* In March 1918 U-boats were sinking a major vessel (one of 500 tons or more) every day; in June only thirteen such ships were lost. Overall, only 1.43 per cent of the 627 vessels on 'through' convoys were sunk and only 1.17 per cent of the

* Considerable resources were expended to little effect on the Otranto Barrage. Despite constant air activity and the assembling of a surface fleet virtually as large as the Dover Patrol, submarines actually penetrated the barrage more frequently than in the period prior to its strengthening. It was technically impossible, in the three to five hundred fathoms of the Strait of Otranto, to sow deep mines (which had brought about most of the U-boat sinkings in the Strait of Dover), and surface and air forces were incapable of sealing off the Adriatic by themselves. Marder, *Dreadnought to Scapa Flow*, v, 35

10,882 vessels on local convoys. Despite the preoccupation of the naval command with Otranto, and the bombing priorities of the Air Ministry, the slow-moving, weak convoy escorts backed up by the bluff of kite balloons and a handful of out-of-date seaplanes defeated the U-boat threat.⁶⁰

But for the Royal Navy the Mediterranean anti-submarine campaign was of little significance compared to the struggle being waged in the approaches to the British Isles. As the German unrestricted attack upon shipping entered its second year, allied hopes for victory were far from being realized, despite the measures taken during 1917. During the first year the Entente lost 6.2 million tons of shipping, the British share being 3.75 million tons, or 20 per cent of the ship tonnage on hand twelve months earlier. At the end of the year the U-boats were still sinking shipping faster than it could be replaced by new construction.

In March 1918, for the first time, the Entente rate of production of new ships surpassed sinkings from all causes, a significant change chiefly attributable to American shipyards. In June British output of merchant shipping rose beyond the tonnage destroyed by direct war causes, and by September it exceeded the total of war and marine risk losses. By that time U-boats were sinking, on average, about 275 tons of shipping a day, in contrast with the 700 a day sunk during the early months of the unrestricted campaign. This was not because critical losses had been inflicted upon the German submarine fleet. Although an average of 6.8 submarines per month destroyed was maintained during 1918 – the highest rate of the war – the Germans managed to commission new submarines at the rate of eight a month. In January Germany had 167 submarines on strength; by the Armistice there were 180. Nevertheless, the war against the submarine had virtually been won by June, a victory that passed almost without recognition. How had it come about?⁶¹

There were two main reasons, one well known and the other less familiar. The first was the adoption of a complete convoy system instead of the ocean convoy system. In January 1918 50 per cent of the United Kingdom's overseas trade was in convoy; by November the proportion had risen to 90 per cent. The second reason was the use of the aircraft to round out the protection afforded to merchantmen by the convoy organization.

The major advantage of general convoy was that it imposed limits upon the previously wide-ranging activities of the U-boats. When ocean convoy began in 1917 German submarines were forced to move closer to the waters of the British Isles and to find most of their victims among the small, independently-routed ships moving up and down the heavily patrolled northeast and southwest coastal waters. In March 1918 a regular Irish Sea convoy began to run out from Liverpool; at the same time the revitalized Dover Barrage was cutting down on the number of submarines passing through to the western English Channel. When the Flanders flotillas were deflected to the northeast, where only part of the shipping was in convoy, losses rose steeply. From June, however, virtually all trade from the River Humber northward was in convoy. This development, coupled with a general extension of the inshore convoy network elsewhere, forced the U-boats once more to the deep waters of the Atlantic, out of range of aircraft, although they continued to pick off ships in those coastal areas still not part of the convoy system.

The British sea and air escort forces defeated the submarine despite an Admiralty attitude that, at best, was ambivalent towards convoying. Most senior naval officers took the view that it was 'a deterrent, and not a reliable safe-guard.' As Commander D.W. Waters has explained: 'the Naval Staff was untrained in the work, and by training was antipathetic to the whole concept of mercantile convoy which, to the end of the war, it regarded as a palliative and not as a system of war.' What the staff favoured was the 'offensive' strategy exemplified by such large mined areas as the Dover, Otranto, and Northern barrages. Naval Headquarters was torn between those who favoured hunting patrols and those who favoured convoy escorts, with the result that the whole convoy organization suffered in the competition for equipment. Hunting patrols were created for the Irish Sea and North West Approaches, and in the spring the Admiralty further stripped the escort force to create another patrol that covered the Fair Isle passage between the Orkney and Shetland islands. The convoy system was left with slow older vessels, unequipped with hydrophones because it was thought that the underwater noise of many propellers rendered the listening device ineffective, while newer destroyers better suited to the work were fruitlessly chasing about elsewhere.⁶²

The employment of aerial resources in anti-submarine work was similarly affected. In January 1918 291 seaplanes (a sixth of them flying-boats) and twenty-three aeroplanes were being used for patrols around the British Isles. Convoy escort was left to fifty-four non-rigid airships and kite balloons. At that time the Admiralty, which had originally hoped to strengthen its patrols with fifty Handley Pages, looked forward to receiving a squadron of Blackburn Kangaroos and perhaps some DH4s and DH9s. Most pressing was the need for short-range aircraft to operate over the inshore shipping routes, particularly as the U-boats began to concentrate along the northeast coast and the waters off Devon and Cornwall. The outcome was a makeshift plan to establish 'protected lanes' for shipping up to ten miles from the coast, a plan very similar to the discredited scheme of anti-submarine ship patrols that had operated in 1917. The intention was 'not so much to destroy the submarines ... but to frighten them off' by sending an aircraft along the protected lane every twenty minutes. Ready to hand, and in plentiful supply, was an outdated trainer, the DH6. Available to fly it were a miscellaneous assortment of airmen who, for one reason or another, had been rejected by the Training Division for full operational flying, and who could be 'stiffened by ... 10% admixture of effective pilots'.⁶³ As it happens, a good many Canadians found themselves involved in this *ad hoc* enterprise, though it is now impossible to determine what proportion of them were considered a part of the 'effective' 10 per cent.

The Air Ministry agreed to allocate twenty-nine flights of six aircraft each to carry out the protected lane plan, the DH6 to be used as a 'temporary expedient' for four months. The flights began to form in April, and were located in accordance with naval priorities. They were incorporated into the RAF's United Kingdom organization, which comprised five areas each containing a number of groups. The process of consolidating the DH6 flights, and other maritime units, into squadrons and wings was spread out over most of 1918.⁶⁴

As far as Canadians were concerned, it was the area coming under the Vice-Admiral East Coast of England that drew the majority of them. From its headquarters at Habrough, Lincolnshire, No 18 Group controlled the non-rigid airship

base at Howden, three squadrons of DH6s, a flight of Blackburn Kangaroos* at Seaton Carew, seaplanes from the latter station and from Hornsea, and, for a time, seaplanes at Killingholme and South Shields.[†] From early summer onwards Killingholme was in process of being taken over by the United States Navy. During the period of transition Captain A.H. Munday, one of the last Canadian pilots to leave the station, attacked a U-boat on 8 June. Another Canadian, Lieutenant R.R. Richardson of Guelph, Ont., stationed at Seaton Carew, was one of the more successful and aggressive pilots in the command.[‡] He was in action against a U-boat on 10 May while flying a Sopwith Baby over Robin Hood's Bay. In June Richardson was one of the pilots selected to fly the Blackburn Kangaroo, together with Second Lieutenants W.F. Stephens of Gananoque, Ont., and G.F. Ward of Stratford, Ont.[§]

This useful aircraft gave the Seaton Carew flight the best anti-submarine record of any British unit and demonstrated what could be done with better machines. Between 1 May and 11 November airmen flying the Kangaroos sighted twelve U-boats and attacked eleven of them; they averaged a sighting for every fifty hours compared to 196 hours for flying boats and 2416 hours for coastal aircraft. On 28 August a Kangaroo dropped a 520-lb bomb on a submerged submarine off Runswick Bay that had been attacked by trawlers after torpedoing a merchantman. The aircraft was then joined by the destroyer *Ouse* and between them they destroyed it with depth charges and another bomb. On a rocky bottom in fourteen fathoms of water divers found the remains of UC 70. Before the end of August Richardson had bombed submarines off the coast on at least three occasions. In the swept channel off the Tees on 3 September, Richardson reported: 'I sighted a hostile submarine in position 54° 38' N, 0° 52' W ... She was steering slowly N.E. and the top of her conning tower was just visible ... about a mile away on my port bow ... I released my first bomb at 1225 which detonated 15 yards astern of the conning tower ... Oil and some bubbles rose to the surface but no further results were observed.'^{||}

The DH6 squadrons on the east coast contained many Canadians, especially No 256, with flights at Seahouses and New Haggerston in Northumberland, which appeared to have been about half Canadian.[§] The DH6 airmen operated under

* The Blackburn Kangaroo was a heavy bomber and anti-submarine patrol biplane. It was powered by two 250-hp Rolls-Royce Falcon motors. It had a maximum speed of 98 mph and could carry four 230-lb bombs. Only fourteen Kangaroos saw service and these flew anti-submarine patrols on the east coast. Owen Thetford and E.J. Riding, *Aircraft of the 1914-1918 War* (Marlow, England 1954), 7.

† Before the expansion of the command there were four Canadians flying seaplanes and flying boats: A.B. Massey, A.H. Munday, and V.H. Ramsden, all of Toronto at Killingholme; and A. Woods of Elmira, Ont., at South Shields, which was not used for operational flights after May. At Howden, J. Sproston of Montreal was flying non-rigids.

‡ Other Canadians in the Command were L.F. Ross of Hamilton, Ont., at Hornsea; and N.E. Lashbrook, address unknown, and H.M. O'Loughlin of St Catharines, Ont.

§ Of the twenty-four officers in 256 Squadron in September, eleven were Canadians: G.E. Douglas of Tecumseh, Ont., T.A. Duval of Quebec City, W.G. Freel, address unknown, A.F. Head of Hagersville, Ont., H. Jamieson, address unknown, C.W. Kerr of Hamilton, Ont., E.D. Macfarlane of Vancouver, W.G.G. Murdoch, address unknown, W.R. Reid of Seaforth, Ont., W.N. Stanley of Lucan, Ont., and W.J. Tansey, address unknown.

conditions of extreme difficulty. Their obsolescent aircraft was powered by an unreliable 90-hp Curtiss OX 5 engine and could not carry both an observer and bombs. The view from the cockpit was poor. The machine was known in the service by such terms of derision as 'the Sky Hook,' 'the Clutching Hand,' 'the Crab,' 'the Flying Coffin,' and 'the Dung Hunter.' Its only saving grace was that it was easy to fly. Aircrews, however, were mostly inexperienced and untrained for the job; many suffered from medical disabilities contracted in other theatres. Pilots were always in short supply, meaning a heavy work load for those available. So were observers, and their ranks were often filled up by trawlemen borrowed from local naval bases. On the ground conditions were no better. Supply and repair facilities were poor, there were never enough armourers, and the bombs, piled in open fields under tarpaulins, often failed to detonate. Living accommodations were primitive, as illustrated by the following signals, cited by the Admiralty when attempts were being made to persuade the Air Ministry that better treatment was needed:

Camp at Tynemouth, flooded out; all men's clothing and bedding wet through and in a disgraceful condition. Some of the tents blown down, others floating about.

Officer's marquee at Elford collapsed during last night; impossible to re-erect as canvas is rotten. Men's field kitchen has no cover. Cooking only possible in boilers and field urns out in the open.

All tents at Seahouses flattened, messing being arranged in temporary billet.⁶⁷

It was not the trenches, but it was bad enough.

Yet had the DH6s not been flying their patrols, shipping losses would have been much greater. In the narrow war channels, hedged to seaward by minefields, U-boats knew exactly where to wait to catch vessels steaming independently. Once aeroplanes began periodically crossing their routes, submarine commanders had to be warier. If all went well, the DH6s usually stayed aloft for more than an hour, but ditchings, caused by engine failure, were frequent. The aircraft's unexpected seaworthiness – it was known to stay afloat for as much as six hours – reduced drownings from these mishaps.

Moreover, DH6 crews were frequently in contact with submarines. Many Canadians on the east coast had this experience; for example, Lieutenant D. Girardot, address unknown, on 14 July and Second Lieutenant G.E. Douglas of Tecumseh, Ont., on 24 August. Both carried out bombing runs upon submerging U-boats before calling destroyers to their assistance. Two pilots from Seaton Carew, Lieutenant H. MacPherson of Calgary and Second Lieutenant H.C. Cook of Gravenhurst, Ont., were both in contact with what may have been the same submarine off Whitby on 29 September. That same month Second Lieutenant J.A.R. Mason of Stratford, Ont., flying out of Tynemouth,* was one of four pilots recommended to

* Other pilots on these DH6 squadrons included E. Anthony of Maitland, NS, E. Langston of Winnipeg, J.B.B. Paterson of Saint John, NB, and H.W. Press, address unknown, with 251 at Atwick and Owhorne, Yorkshire; H.L. Stevenson of Chatham, Ont., with 252 at Redcar; A.D. Geiger of Cobourg, Ont., and F.L. McGuire of Chelmsford, Ont., with 252 at Seaton Carew; and T.G. Blakely of Winnipeg, C.B. Gibson of Welland, Ont., and H.O. Prout, address unknown, with 252 at Tynemouth.

the Admiralty as having 'distinguished themselves in regard to DH anti-submarine work at the commencement of this class of flying.'⁶⁸

The other RAF groups in which DH6s served were Nos 9, 10, 14, and 22, operating off the south, southwest, and west coasts. Though there were fewer Canadians flying DH6s in these groups, they were to be found in virtually all their scattered flights.* Most Canadians in these commands, however, were operating flying-boats or seaplanes to seaward of the protected lanes, either on patrol or on convoy escort, and a few were lighter-than-air pilots.[†] The seaplane stations in the four groups formed an interlocking network of patrol areas, stretching from Newhaven around to Stranraer in the North Channel. One of No 10 Group's units, 243 Squadron, was based at Cherbourg and co-ordinated its efforts with the French Naval Air Service. Calshot in the Solent was the group's principal station and operated the RAF seaplane training school as well. The stations of No 9 Group were responsible for patrolling from Lyme Bay around to the turbulent waters off Land's End. On 8 July Lieutenant F.H. Prime of Toronto was second pilot of a flying-boat that was forced down by engine failure off the Cornish coast. The crew had to be rescued by the hospital ship *Braemar Castle* as their aircraft broke up in the heavy seas. No 14 Group had only one seaplane station, at Fishguard on the Welsh coast, where Shorts co-operated with airship and DH6 patrols in the Irish Sea. Because there were few shipping routes through the western isles, most of No 22 Group's anti-submarine stations were on the Scottish east coast. A number of Canadians had long service in this area. At Dundee Captains A.H. Sandwell, W.R. Kenny, and J.G. Ireland were all veterans, the last two having started their third year in mid-1918. All had brushes with U-boats, those of Kenny being typical. On 3 June, when flying an H16, he carried out a bombing attack on a diving submarine. The next month, when piloting a Short 184, he interrupted a U-boat 'manoeuvring to attack ... [a] large steamship,' and dropped two 100-lb bombs aimed at its periscope from a height of seventy feet. German records indicate that neither attack was successful.⁶⁹

The circle round the British Isles was completed by No 23 Group in the extreme northeast and No 4 Group in the southeast of England. Both groups lent them-

* In No 9 Group O.H. Bertrand and T. Derval, addresses unknown, I.W. Dunbar of Brandon, Man., H.M. Fletcher, address unknown, F.E. Fraser of Winnipeg, L.M. Lewis of Montreal, C.A. McConvile of Kingston, Ont., and J.A. Shaw of Edmonton, flew with 252 Squadron, Prawle Point; H.E. Bourke of Winnipeg, and W.W. Brown of Montreal were with 236, Mullion; and C.R. Hoare, address unknown, was at 250, Padstow. With No 10 Group were J.W. Reid, and R.T. Steward, addresses unknown (KIA 13 Sept. 1918), and S.B. Wright of Perth, Ont., in 242 at Newhaven. L.G. Arcand of Montreal, R.S.S. Chaffe of Waterdown, Ont., and H.L. Tamplin, address unknown, flew with 255, Pembroke, part of No 14 Group. G.A. Coulter of Toronto and M. Furtney, address unknown, were in 258, Luce Bay, a No 22 Group squadron. With 253 Squadron at Newhaven were A.A. Forhan, J.A. Glen, and H. Gordon, all of Toronto, H.C. Hagaman of Oakfield, Ont., and H.A. Peck of Montreal, all of whom flew DH6s. On the same station were two Canadian observers, A.R. Beveridge, address unknown, and H.S. Quigley of Toronto.

† R.H. Berryman, address unknown, G. Moore of Montreal, A.R. Purchase, address unknown, and F. Van Praagh of Vancouver were pilots at Pembroke Airship Station; while J.G.G. Layton of Dundalk, Ont., was a pilot at Luce Bay Airship Station.

selves to 'offensive' operations, and were demonstrably favoured by the Admiralty in material allocations.

No 23 Group's job was to provide air patrols for the Northern Barrage. This great minefield, stretching between the Orkneys and the approaches to Hardanger Fjord in Norway, had been started in early March. It had been sown by the RN and the USN, with the Americans laying most of the mines. Its surface patrols, equipped with hydrophones, had been milked from the convoy organization. Since these patrols could not cover the whole of the barrage, the rest was placed under aerial surveillance from towed kite balloons and flying-boat patrols. Most of the twelve Canadians with this force flew from Houton Bay Station in the Orkneys; two were at Catfirth Station in the Shetlands.* The Admiralty gave the northern air patrol 'first priority' for aircraft, but got little co-operation from the Air Ministry. 'A great naval effort is being made during the summer months to attack enemy submarines passing Northabout, and it had been hoped to obtain considerable assistance from air patrols,' the Admiralty complained in July. 'Their Lordships have been much disappointed in this respect.' Ultimately the Air Ministry proved compliant, but its efforts came too late. The inshore convoy network was already forcing the U-boats into the Atlantic deeps west of Ireland. Moreover, as with the Otranto Barrage, U-boats do not appear to have had much difficulty in sneaking through the mine fields, whether by way of Norwegian territorial waters or through the Fair Isle passage.⁷⁰

No 4 Group, embracing the former RNAS bases from East Anglia round to the Thames Estuary, was the largest and operationally the most active in Britain. Lieutenant-Colonel C.R. Samson commanded six squadrons of flying-boats (the largest such concentration in the service) at Felixstowe, as well as seaplanes, flying-boats, and aeroplanes at Westgate, Manston, Yarmouth, and Burgh Castle, the airship station at Pulham and the KB Section at Lowestoft. More Canadians were borne on the books of this command in 1918 than on those of any other group. Nearly half of them were pilots at Felixstowe, flying Large Americas.

Because submarines seldom ventured into the shoal waters off East Anglia, the convoy network was not extended below the Humber. No 4 Group's only involvement with convoys was to provide escort for the Anglo-Dutch 'beef trade.' Most of the aircrew of Samson's command were occupied in a constant routine of dawn-to-dusk patrolling. As we have already seen, much of the work of 228 Squadron, commanded by Leckie at Yarmouth,[†] and the flying-boat organization at Felixstowe, including 232 Squadron commanded by Major J.L. Gordon of St Lambert, PQ, was in contact with long-range special reconnaissance and offensive operations

* At Houton Bay were H.V. Acland, G.S. Black, T.G. Gordon, and J.D. Guild, addresses unknown, C. MacLaurin of Lachine, Que., A.B. Massey of Toronto, J.P. Pile, address unknown, W.B. Powell of Hamilton, and P.H. Take, address unknown. G.R. Hodgson of Montreal, and H.A. Wilson of Westmount, Que., served at Catfirth.

† Other Canadians who served in 228 Squadron included A.P. Bell of Belleville, Ont., W.H. Comstock of Brockville, Ont., F. Eppinger of Vancouver, V.S. Green, address unknown, L.W. Kidd of Listowel, Ont., G.E. Lewtas of Coniston, BC, A.L. Rice of Edmundston, NB, E.D. Warren of Winnipeg (killed 5 Dec. 1918), and L.W. Wilson of Lakeville, NS.

in the Heligoland Bight.* Other seaplane units operated inshore, performing 'all the routine dirty work' including escorting single merchantmen, patrolling over the War Channel and minefields, responding to submarine alarms, and flying anti-zeppelin patrols.[†] The aeroplane pilots[‡] in the command were part of the home defence organization, and were also used for such duties as anti-submarine patrols.[§]

The main anti-submarine work, however, remained with Groups 9, 10, 14, 18, and 22. After a few months' experience it was plain that the projected lane patrols were as ineffectual in safeguarding merchantmen as were the long-standing seaplane patrols. Instead, most heavier-than-air craft, by July, had been incorporated in the steadily growing coastal convoy system, and provided constant air escort within the limitations of weather and light conditions. Over the last six months of the war a daily average anti-submarine strength of 189 aeroplanes, 300 seaplanes and flying boats, and 75 airships was maintained at Home Stations, and on average 310 of these were operational.[§] During the year over seven thousand escort sorties were flown, nearly five thousand of them by heavier-than-air craft, and as well there were 131 kite balloon-escorted passages. Despite a steady increase in the number of vessels using the system, the already small loss rate in convoys was

* From available records it is difficult in most cases to determine whether a Canadian was flying on operations or was at Felixstowe for flying-boat training only. Squadrons are shown where known: G.B. Anderson of Ottawa, C.W. Bailey of Winnipeg, H.J. Bath of Oakville, Ont., L. Bennett of North Vancouver (230), W.G. Boyd of Hamilton, Ont., C.H. Browne of Toronto, C.J. Clayton (230) of Victoria, BC, W.H. Comstock of Brockville, Ont., A.R. Cotton, address unknown, S.D. Culley of Montreal, R.D. Delamere (231) and A.S. Downey, both of Toronto, J.O. Dufort of Ottawa, N.G. Fraser and J. Freeman, both of Toronto (POW 9 Nov. 1918), J.O. Galpin of Ottawa, J.L. Gordon (232) of St Lambert, Que., C.W. Gracey of Weston, Ont., F.E. Griffis of Toronto, J.D. Guild of Kenney, Man., T.D. Hallman of Toronto, H.H. Harvey of Avonport, NS, D.H. Harness of Nanaimo, BC, G.R. Hodgson of Montreal, L.W. Kidd of Listowel, Ont., J.A.Y. La Forest of Hull, Que., J.W. Locke, address unknown, C. MacLaurin of Lachine, Que., E.L. Macleod of Atchelitz, BC, L.W. Marwick of Hamilton, Ont., C. McNicoll of Montreal, E. McC. Moir of Halifax, A.H. Munday of Toronto, A. Partridge (Tech), address unknown, A. Rankine of Montreal, P.H. Take, address unknown, J.C. Watson of Victoria, BC, L.E. Wells of Belleville, Ont., H.A. Wilson of Westmount, Que., W.E. White of Oshawa, Ont., and A. Woods of Elmira, Ont.

† Canadians in these units included Sydney Anderson and R.O. Cutler, both of Vancouver, G.R. Halliday of Victoria, M.J.P. Hennessy of Haileybury, Ont., and T.B. Simpson of London, Ont., at Yarmouth; and O.J. Dean of Regina, Sask., A.G. Hodgson of Nelson, BC, A.H. Pearce, address unknown, and R.S. Percival of Ottawa, at Westgate.

‡ In No 273 at Burgh Castle were J.N. Bicknell of Toronto, W.J. Carroll of Kingston, Ont., J.L. Killoran of Peterborough, Ont., and W.R. Waterman of Ottawa. At Yarmouth there were R.E. Cameron and S.D. Culley, both of Montreal, G.D. Kirkpatrick, E.R. Munday, and W.K. Prendergast, all of Toronto, and G.T. Scott, F.J. Vincent, and F.R. Walpole, addresses unknown, all in 212 Squadron. At Manston in 219 Squadron were R.O. Ellis of Toronto, D.M.B. Galbraith of Carleton Place, Ont., L.M. Lewis of Montreal, H.H. Reade of Ottawa, G.H.G. Smythe of Toronto, R.E. Sproule of Ottawa, J. Tomkins of Kingston, Ont., W.J. Windrum of Parry Sound, Ont., and L.E. Wood of Winnipeg.

§ By comparison, during the most critical periods of the Battle of the Atlantic, in February 1943, Coastal Command RAF mustered 118 flying-boats and 293 A/S aircraft based in the UK, Northern Ireland, Iceland, and Gibraltar, of which total 210 were operational. There is no comparison, of course, between the capabilities of aircraft in the two periods.

reduced by two-thirds in the period of aircraft participation. In the course of the six attacks on convoys with air escort in 1918, U-boats succeeded in sinking only three ships, two of them during the same attack. Merchantmen sailing alone continued to bear the brunt of the submarine onslaught.⁷²

Air tactics in coastal convoy were simple. Airships accompanied convoys for all or most of their passage; heavier-than-air craft worked in relays as convoys passed along the coast. Normally airships worked close in to the convoy, while aeroplanes and seaplanes patrolled at its head, or, 'where two were available ... the second Seaplane should patrol on ... the most dangerous side ... and where three were present ... there should be one ahead and one on each beam.' The effect of these dispositions on U-boats was twofold. They were deprived of the advantage of surprise by the distant air escort ahead and forced to dive, thus curtailing their ability to manoeuvre for attack. Secondly, they gave away their exact position to the close escort as soon as a torpedo was fired. The contact records show how shy submarines were becoming of aircraft: in 1917 U-boats were spotted on 169 occasions and engaged 106 times; in 1918, with a flying effort three times as great, there were 192 sightings and 131 attacks.⁷³

Air surveillance forced the U-boats to change tactics. Nearly two-thirds of attacks in the last stage of the war were made by lone surface boats at night, when air coverage was reduced to slow airships or kite balloons and submarines could best take advantage of their high speed and low silhouette. In addition, submarine commanders became highly skilled in taking avoiding action when under aerial attack. Their boats were later fitted with altiscopes that permitted them to scan the skies before surfacing. The U-boats also redirected their attention to ocean convoys outside the one- to two-hundred-mile range of aircraft based in the British Isles, while others moved across the Atlantic to the American and Canadian eastern seabards.⁷⁴

Many technical counter-measures were under investigation in Britain before the end of the war, but few had reached the operational stage. For example, seaplanes equipped with hydrophones had carried out trials in early 1917 in the smooth waters of the Aegean, and these trials were followed up the next year at Grain Experimental Depot.* A few hydrophones were fitted to operational aircraft but little use was made of them. Nevertheless, ssz [Sea Scout Zero] airships at Mullion were regularly using, in late 1918, what might be described as the father of 'dunking sonar,' towed hydrophones, and the Admiralty had on order an improved set known as the 'Rubber Eel.' Aircraft needed an explosive suitably fused for dropping on submarines. Most bombs employed were much too light, while depth charges dropped from aeroplanes burst upon hitting the water. To illuminate surfaced submarines attacking at night, Scarlett proposed that aircraft carry a searchlight, along the lines of the Leigh Light used so successfully in conjunction with radar twenty-five years later. Various experiments were also carried

* At Grain, the Canadians serving were H.B. Brenton of Vancouver, L.L. Lindsay of Calgary, K.D. MacLeod of Ste-Anne-de-Bellevue, Que., A.B. Massey of Toronto, L.S.S. Punnett of Victoria, B.C., and K.M. Smith of Toronto, all senior pilots; and H.O. Merriman of Hamilton, Ont., a technical and wireless expert.

out to develop mines that could be dropped from the air, but the technical difficulties proved too great.⁷⁵

The role of aircraft in defeating the U-boat campaign in 1918 has frequently been overlooked. While it is true that, with one notable exception, aircraft failed to destroy submarines, they exercised, when employed as close and distant escorts to convoys, a most decisive effect – they rendered convoys virtually immune from successful attack. The effectiveness of air cover for convoys was not perceived at the time, because shipping losses remained fairly high to the last weeks of the war. On analysis, however, it becomes clear that these losses occurred mainly among single vessels steaming towards a convoy assembly port, heading away from a convoy dispersal point, or among stragglers from convoy. Even so, there were those who saw the value of air cover. The Rear-Admiral Commanding at Falmouth assigned the success of the French coal trade convoys, which lost fifty-three ships out of 39,352 or a loss rate of 0.14 per cent, to the air escort which rendered them safe from attack by day. The Vice-Admiral Commanding East Coast of England reported that attacks on convoys with aerial escort 'were becoming increasingly rare no matter how favourable ... the circumstances were. An attack on a convoy protected by a kite balloon never took place.'⁷⁶

The success of the anti-submarine campaign was partly the result of the harnessing of aircraft to the convoy system. It was in no way attributable to the development of any high degree of collaboration between the Admiralty and the Air Ministry. The early promise of amicable relations had faded in little more than a month after the birth of the RAF. In May Geddes, the First Lord, told the Air Ministry that the Admiralty had accepted the extinction of the RNAS under protest, and that its fears 'are being confirmed as time goes on. The use of aircraft with the Navy is not developing as it should.' Quarrels between the two services punctuated the remainder of the year. Most of them centred upon the allocation of aircraft.⁷⁷

One of the most acute clashes was over torpedo-carrying aircraft. Beatty had been promised a hundred Sopwith Cuckoos by the end of July and a supply of trained pilots to fly them a month later. Only three of the new aircraft had appeared at East Fortune by the beginning of August. Beatty, who wanted the Cuckoos to launch an attack upon the High Seas Fleet, exploded in anger to Wemyss. The latter agreed that 'the Air business is the very devil, and we are having a regular rumpus with the Air Ministry.' A few days later the Air Ministry sliced the navy's allocation for 1919 from 130 squadrons to ninety-five and, on the basis of a paper from Sykes, increased the quota of bombers at the expense of anti-submarine aircraft. Here was something much more serious than material shortages. Was it true that bombing was more important than the anti-submarine campaign? And was the Air Ministry the appropriate and competent body to decide such a question? Geddes declared that 'the responsibility for anti-submarine strategy must always rest with the Admiralty, and the Board could not accept reduction of its demands for aircraft on the grounds of disagreement or criticism by the Air Council in any detail of its submarine strategy.' In reply, Sykes simply asserted that the Air Council had every right 'to examine requirements and to advise on how aircraft should be employed.' Much more conciliatory, Weir managed to find

a formula for adjusting the 1919 allocations that was satisfactory to both parties. But the questions raised by this clash had not been resolved, nor were they during much of the Second World War.⁷⁸

Some of the navy's problems, however, could be laid at the door of the Admiralty itself. The delay in receiving torpedo-carrying aircraft had less to do with the Air Ministry's inefficiency than with the navy's own downgrading of the need for such aircraft. The Sopwith Cuckoos did not find a home until the carrier *Argus*, a flush-decked 'super-haystack' gaudily painted in blue and white, joined the fleet on 14 September 1918. Pilots for her had been under training at East Fortune, and on 1 October 185 Squadron of twenty Cuckoos was formed for service with her.* The crude arrester gear, consisting of wooden ramps and fore-and aft wires, gave some trouble initially. 'During my whole service afloat I never saw so many people in the sea as I did while I was in command of the *Argus*,' wrote H.H. Smith; 'but although many ... went overboard, not a single pilot was injured in any way.'⁷⁹

Events almost gave the new squadron an opportunity against the High Seas Fleet. On 20 October all U-boats were called in, since one of the stipulations for negotiating an armistice was that no further attacks upon merchantmen take place. They were now available to act as an advanced scouting force for the High Seas Fleet. On 29 October, with Scheer's approval, Von Hipper issued orders for the entire fleet to raise steam for a sweep into the North Sea. This order brought disorder throughout the German fleet. The ships did not put to sea, and by 4 November all German naval ports were in the hands of mutineers.⁸⁰

The first Canadians on maritime duties to see tangible results of the Armistice agreement were R.D. Delamere and Robert Leckie of No 4 Group, as they flew over a contingent of U-boats surrendering to the Harwich Force on 20 November. The next day the Grand Fleet, reinforced by ships from the French and American navies, steamed to meet the High Seas Fleet. Lindley B. Calnan, a young kite-balloon specialist from Picton, Ont., viewed the scene from *Ajax*: 'I was fortunate enough to be in the foretop ... and so was one of the first to see through the mist a balloon ... carried by our own light cruiser *Cardiff*. Following her the Huns were in "single line ahead." This conquered line steamed between our lines so that three miles on either hand they saw an escort more powerful than themselves ... we escorted them to a point off Inchkeith, where they anchored and were searched by us.'⁸¹ At sunset the High Seas Fleet hauled down its colours for the last time.

The Royal Navy had achieved the ultimate objects of Admiralty policy. Its distant blockade had weakened the will of the enemy populace to resist, and the navy and its airmen had overcome all interference with allied use of the oceans. Faulty judgment and plain conservatism had affected adversely the naval use of air earlier in the war, but in 1918 senior officers had attained a more mature appreciation of the importance of air power. In September (at the request of the Air Ministry) the Admiralty had sent out a questionnaire to Commanders-in-Chief and Flag Officers Commanding, asking for their 1920 aircraft requirements. The replies were illuminating.

* W.H. Mackenzie of Victoria, BC, was a senior instructor at East Fortune. Serving with No 185 were pilots H.J. Armstrong of Toronto, A.M. Avery of Delhi, Ont., G.H. Boyce of Ottawa, and I.M. Martin of Kingston, Ont.

nating: they included requests for long-range shore-based air escorts for convoys, merchant aircraft carriers, and escort convoys. They indicate that the navy had finally grasped that the most valuable work done by naval airmen in 1918 was in anti-submarine operations. This task, involving at least 215 Canadians, was anything but dramatic in nature, nor did it result in a heavy toll being taken of submarines. Yet the defeat of the submarines owed much to aircraft, and that defeat meant that enough merchantmen were able to deliver their cargoes.

The measures recommended in 1919 were all eventually adopted during the Second World War; the 1918 questionnaire itself, however, was never acted upon and faded quickly from official memory. The myth that anti-submarine aircraft were involved hardly at all in the battle against German U-boats was created by their rapid and complete disappearance from air force lists soon after the Armistice. When RAF Coastal Command later came into existence, its roles were defined as co-operation with Bomber Command in the main strategic offensive and co-operation with naval forces, in that order. At the same time, naval planners downgraded convoy to the status of a 'defensive' measure in the postwar era. No complete British record of anti-submarine air and sea operations in the First World War was written. The official air history had many gaps, while that of the navy could well be an account of an earlier 'Great' war for all the mention it makes of aviation. Most of the lessons in anti-submarine warfare would have to be re-learnt the hard way over the wastes of the North Atlantic two decades later.⁸²

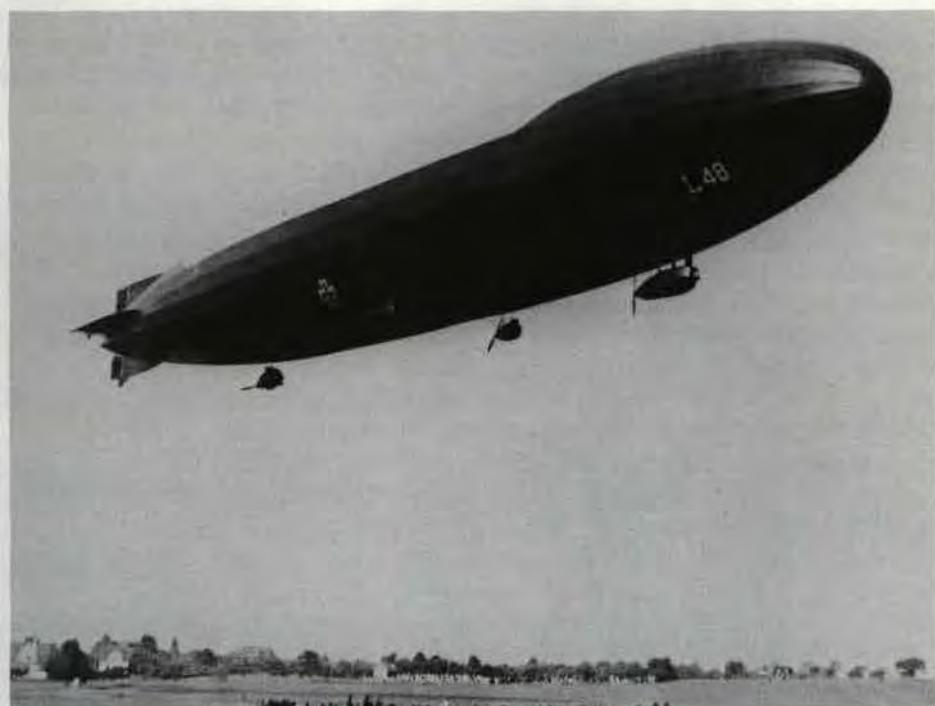
PART THREE
Strategic Airpower



This crater in a London street was the result of an early zeppelin raid. (LC 56)



The wreckage of L 31, at Potter's Bar, London, on 2 Oct. 1916 (AH 466)



On her first raid L 48 fell to the guns of Torontonian L.P. Watkins on 17 June 1917. Among the fourteen victims was *Korvettenkapitän* Viktor Scheutze, the chief of the German Naval Airship Division. (Q 58467)



Lt Wulstan J. Tempest, of Perdue, Sask., who shot down the L 31. Tempest won the DSO for his night's work and he later won an MC on bomber operations.

(RE 21004)



2/Lt L.P. Watkins of Toronto who shot down L 48. Three of the crew of 17 survived. Watkins, who was awarded an MC for his feat, died of wounds received on the Western Front in July 1918.

(AH 604)



The Gotha G-V had an additional pair of wheels under the nose, to ease the stress of landing, and a 'tunnel' through the fuselage which permitted the rear gunner to fire downwards as well as laterally and upwards. (PMR 72-526)



SL 11 coming down in flames on 2 Sept. 1916. 'The blazing mass radiated a red-yellow light and illuminated the area over a wide radius and fell slowly,' reported the commander of another zeppelin who watched the incident. There were no survivors. (Q 68200)



Gotha G.IVs of *Kagohl 3*, later known as the *Englandgeschwader*, lined up on one of the squadron's three airfields near Ghent in Belgium, in the spring of 1917. (Q 108845)



An awed crowd of German officers and men inspect one of *Kagohl 3*'s new Gotha bombers, 1917. (Q 108838)



*Hauptmann Ernst Brandenburg, the 35-year-old commander of the *Englandgeschwader*. At his throat hangs the eight-pointed blue and gold cross of the Pour le Mérite, Germany's highest decoration for valour, awarded him after the first Gotha raid on London, 13 June 1917. (Q 108840)*



*Officers of the *Englandgeschwader* (and their lady friends) on the terrace of the Chateau-Drory in the spring of 1917 (Q 109948)*



The wreckage of a Gotha bomber shot down over Manston, Kent, in August 1917
(PMR 70-104(e))



A London bus which was damaged in the vicinity of Liverpool St railway station. It was probably a victim of the first raid by the Goths of the *Englandgeschwader*, on 13 June 1917. (Q 70238)



London firemen hose down a bombed building after a German bomber raid. (HO 77)